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# American Foundryman

A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES

December
1942

# What the Foundry Industry Owes the Navy

FOR a number of years the Navy has spent considerable time and money in making many tests and experiments, mainly concerning steel castings, and have deputized various employees to present the knowledge obtained to the foundry industry through the medium of the A.F.A.

The question naturally arises as to why the Navy, a separate branch of the Government, should embark on such an effort to the benefit of any particular industry. When analyzed fully, however, it all falls in place as a well-ordered plan.

The Navy realizes that it is one of the largest users of important castings, especially steel castings. It has been foresighted enough to appreciate the fact that if it obtained knowledge by making experiments and tests concerning the industry's problems, and disseminated this knowledge to the industry to help overcome these problems and produce better castings, the Navy would not find it as difficult in obtaining the necessary castings to meet its exacting requirements.

This country has always been a peaceful one, and Americans in the industry perhaps have never before realized and appreciated the necessity for the exacting specifications that the Navy demands. From December 7, 1941 up to the present minute, they have come to appreciate this necessity. There probably have been many occasions where the question of whether a ship sank or remained afloat, depended upon the integrity of its component parts. We have all come to realize that with our sons, relatives, friends, neighbors and employees on board these ships in some far-off sea, their return or non-return may depend upon a casting which we ourselves produced.

The present emergency, unhappily, gives the Navy an opportunity to judge whether or not its investments in past experiments are giving any appreciable return. The Navy needs ships and more ships, but it needs good ships. The purpose of any naval battle is to sink the other fellow's ships, but we want to be **sure** that the superiority of our ships will enable us to sink the enemy's ships.

The only way our ships can be superior, is to have their component parts superior. It therefore is the duty of every man in the foundry industry to see that the Navy and our other armed forces always get good castings. It has been said that our boys are the best fighters in the world . . . let's give them the best material to fight with.

I feel that the industry can do no better than to apply to castings the following motto, which is cast in bronze and mounted on a stone at the entrance of one of the largest shipbuilding plants in the country:

"We will always build good ships
At a profit if we can, at a loss if we must,
But we will always build good ships."

S. W. Brinson
MASTER MOLDER, U.S.N.

*S. W. BRINSON, Master Molder, Norfolk Navy Yard, Portsmouth, Va., has made many outstanding contributions to Steel Division sessions of A.F.A. Conventions, with papers on steel casting production methods. At the 1942 Convention he co-authored with J. A. Duma an important paper on "Studies of Centerline Shrinkage of Steel Castings," and has authored other notable papers on steel casting design for Navy work, especially centering attention on the use of models for improving casting methods. He also has been active in A.F.A. chapter work, at present serving as Director of the Chesapeake Chapter.*

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# American Foundryman

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*December, 1942*

Volume 4 Number 12



Published by the American Foundrymen's Association, Inc., 222 West Adams St., Chicago, Ill., for the purpose of presenting Association and Chapter activities. Published monthly. Subscription price, to members, $1.00 per year; to non-members, $1.50 per year. Single copies, 20c.

Entered as second class matter July 22, 1938, at the post office at Chicago, Illinois, under the Act of March 3, 1879.

# Design As Related to Casting Problems†

By E. B. Carpenter,* St. Louis, Mo.

**The design of a casting exerts great influence not only on costs but also on the ability of a foundry to produce a uniform product. Foundrymen should insist that engineers and designers of cast parts cooperate with them so that castings can be manufactured most economically and in such a manner as to have the greatest possibility of uniformity throughout. Good castings are an asset to the entire industry . . . inferior castings are a reflection on it.**

THE cost of a casting is directly proportional to the complexity of design of that casting and to the problems pertaining to the production of that casting. A gray iron jobbing foundry must be prepared to furnish good castings, varying in size and intricacy of design, regardless of the weight, which may vary from a few ounces to several tons per casting. The success or failure of a foundry enterprise depends upon the ability of its organization to sell these castings at a competitive price and at a profit.

Castings design is as much of a selling problem as it is a production problem. The castings buyer furnishes working drawings, patterns or samples of castings needed and expects the foundryman to guarantee a price, weight and delivery to meet the buyer's requirements, when as a matter of fact it is the buyer himself who specifies the price, weight and speed of production because of his own casting design. Many a buyer, however, promptly proceeds to forget the price dictated by the design of his castings and expects to acquire a certain tonnage of cast iron at a price that will be attractive to himself.

This price will probably be less than the foundryman needs to produce the castings. This condition is particularly noticeable to foundries furnishing castings on a contract basis for a customer's entire needs, and it also exists where there is competitive bidding for job lots.

### Foundries Own Problem

The purpose of this paper, therefore, is to point out why casting problems exist because of design, and to point out the fact that the solution of the problems must come from within the foundry industry. Foundrymen must sow the seeds harvested from their own experience, where the returns will be the greatest—among their own customers.

The castings business in a jobbing foundry is drawn from various industries manufacturing a multitude of products, and only in rare instances will a customer operate any type of foundry or have an adequate knowledge of the operation of a foundry. Who, then, are the ones responsible for the design of the castings made? They are engineers who are absorbed in perfecting a process of manufacture peculiar to their own industry.

### Where Trouble Begins

These engineers are intelligent men or women, who have qualified for their position because of education or experience in their chosen line, which very likely has no connection with the foundry industry. Unless the designer has received his basic training in a technical school operated in conjunction with commercial shops, said school being either an educational institution or the training course of a comprehensive industry, it is very unlikely that the designer will have found time to have worked in the various basic types of shops to gain the necessary experience to appreciate the difficulties of shop practice.

A designing engineer is a student and as such will attempt to keep abreast of the times by studying new machinery applicable to his own process of manufacture. Too, he will study machine design, kinematics, and other basic subjects. He will have enough problems to solve in his own field and will not study publications intended for the foundry industry. With a problem at hand, he will arrive at a design by assembling standard machine parts and then the whole assembly will be tied together by the best known medium—a casting.

From his text books and advertising matter the designer will decide on the material from which the casting will be made, but the design or shape of the casting will be a product of his own inventive genius . . . unless someone can change his mind before it is too late. As far as we foundrymen are concerned, it is "too late" after we have agreed to furnish poorly designed castings at a price and find ourselves in trouble and faced with a loss because of the design of the casting.

Volumes have been written on casting and pattern design for the consumption of foundrymen and pattern makers and few experienced foundrymen cannot detect a poorly designed casting from one that is well designed. A competent patternmaker undoubtedly will design a casting and a pattern better suited to foundry practice than many engineers . . . if the customer will pay for a pattern that is properly made.

### Concise Data Needed

It is my contention, therefore, that in spite of all of the fine publications on casting design, this information has not been utilized to best advantage. It would be far better for us if we had a concise pamphlet edited, say, by the American Foundrymen's Association and obtainable at no greater cost than a good cigar for distribution among our customers, than to have our own libraries bulging with handbooks that tell us what we already know.

The latest treatises on machine design go into some detail as to

*The American Car & Foundry Co.

†Presented before a meeting of the St. Louis District Chapter of A.F.A.

how and why the physical properties of cast iron and other cast metals have been improved, and they also tell of the improved qualities to be derived from additions of certain alloys. Yet at no place do these publications point out that all of these improved qualities can be nullified by poor design.

What have we gained if we pour an expensive, high-tensile iron into a casting that will be full of stresses, cracks, draws or other defects? Our whole purpose in improving our castings is defeated unless we couple proper design with quality metal. Where do you suppose our customers got the idea that an iron foundry should honestly produce cheap castings, or where did they get the hope that we could produce some of the designs submitted at all?

#### Design Instructions Quoted

I would like to quote the sum and substance of instructions on casting design appearing in the latest American publications on machine design, edited by outstanding educators in the engineering profession . . . Masters of Science, if you please . . . works that are in general use in engineering colleges as well as in the field today.

1. "Cast iron is the cheapest of metals and it is *easy* to manufacture articles of it."

2. "Cast iron is more commonly used than any other material in making machine parts. This is because it can be given *easily* any desired form."

3. "The principal advantage of cast iron dies is the economy and speed with which they can be made. In some cases where a high degree of accuracy is not required, the die need not be machined. For such a die the pattern may be sent to the foundry one morning and the die made ready for service the next."

4. "On account of cheapness, strength, *ease* with which it may be melted and cast into more or less intricate shapes, *ease* with which its hardness may be varied, cast iron is the most used of the cast metals used in engineering construction."

These remarks would seem to indicate that the wrong men are operating our foundries, for if castings can be produced so easily and cheaply, why are today's successful bidders faced with a loss tomorrow? If castings are so easy to mold into any desired shape why are we faced with casting problems because of design?

#### Reason for Casting Problems

We are faced with casting problems due to improper design because the elements of casting design are not brought to the attention of designing engineers. Inasmuch as authorities on machine design do not respect the problems of molding and casting technique, it naturally falls to the lot of the foundrymen in general to educate their customers by exercising everlasting vigilance to eliminate poorly designed castings.

By these remarks I do not intend to infer that the engineering profession is lacking in ability, competence, or initiative. Quite the contrary. The salvation of the gray iron foundry industry lies in the ability of the foundrymen to create the respect of the designing engineers for foundry products and for the ability of foundrymen themselves.

When a poor design is submitted for a casting, take the time to go to your customer and explain exactly what he should do for his own best interests to get the casting that he needs, and you will develop a mutual understanding and regard for each other's problems. You will receive the respect that you deserve and you will find that you will be given every opportunity to put your products into use in his plant. However, if you accept orders for poorly designed castings your costs will rise, deliveries will be late and your product inferior. You ultimately will have lost a customer and, worse than that, the business may leave the industry because our intelligent friend, the designing engineer, will be quick to discover a substitute.

In recent years a new source of competition has made serious inroads into the foundry industry. I would like to quote the *Engineering Science Series*, published in 1934, where the following observation is made under the heading of Cast Iron: "Welded steel construction as a substitute for castings has grown rapidly; it gives lighter weight for strength and stiffness and often costs less than castings."

#### Strive for Better Design

Therefore, it develops that we are not fostering an abstract ideal when we strive for better casting design. We are, in fact, fighting to preserve the foundry industry which provides our bread and butter.

It would be impossible for me to tell foundrymen how to rig their patterns or how they should proceed to mold castings. There is probably as much ingenuity applied to molding processes as in any other shop practice. A group of experienced foundrymen would probably offer several methods of molding the same casting and all methods would produce good castings and would be efficient in accordance with their shop practice. There are, however, a few elementary facts which should be borne in mind at all times to effect a better casting design.

#### Foundry Should Be Consulted

Impress the customer with the importance of consulting the foundry at all times on casting design and pattern construction. Do not accept a pattern or drawing as of final design until the weaknesses of the casting or suggestions for simplified molding are pointed out to the customer. If it is impossible to talk with the casting designer and you are requested to quote on castings, mark suggested changes on the drawing in a contrasting color and explain your reason for the change. Show any price differential that would result from the change. Give a reliable estimate of weights and do not assume that the weight shown on a drawing is correct. In this way the buyer

will be able to judge how your suggestion will affect his price on each unit regardless of the pound price.

If you are asked to quote on a pattern, explain exactly how you expect the pattern to be made to maintain your casting price. If you do not do this, you probably will receive a cheaply constructed pattern unsuited to your methods and estimates. Indicate the desired shrinkage allowance. In certain instances you will encounter customers who are niggardly about pattern expense. Explain that patternmaking is a skilled craft and that to employ carpenters, maintenance men, or Jacks-of-all-trades to make patterns will lead to trouble—namely, inferior

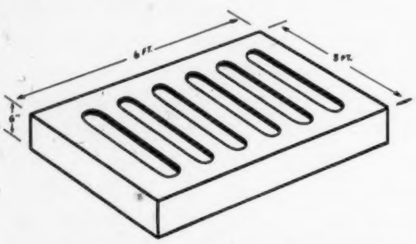


Fig. 1—Example of cheap pattern construction that defeated its own purpose. Patterns were for cast iron dies, to have smooth faces to be used "as cast" without further machining, and were made of 1/4 in. plywood. Core boxes were 2 1/2 in. deep, made of 1 in. nailed lumber. At insistence of customer, patterns were used, but the dies cast required further costly machining. Patterns should have been of at least 1 in. material properly braced, core boxes (as illustrated) approximately 6 in. deep of 2 in. material with 2x3 in. battens.

castings and high casting prices. Use and encourage the use of standard patterns colors.

### Example of Cheap Pattern

Fig. 1 shows an example of cheap pattern construction which defeated the entire purpose intended. Patterns were received for cast iron dies which were to have had smooth cast faces, male and female, and the faces were to be used as cast without further machining.

The dies were five feet by six feet by eight inches thick, and the face was cast in a core. The patterns were constructed from 1/4 in. plywood. Core boxes were 2 1/2 inches deep and were made of 1 in. nailed lumber with 1 in. thick strips on the bottom for stiffness. The core boxes and

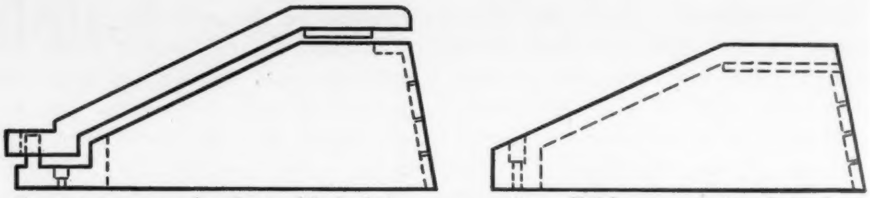


Fig. 2—As a result of simplified design two castings (left) were designed to be cast as one piece (right), thus eliminating breakage, increasing the serviceability of the part and lowering direct labor cost by 53 per cent.

patterns were too light to retain their shape when subjected only to their own weight and would spring out of shape when rammed or rapped. Cores were too thin to withstand handling.

We explained to the customer that the core boxes should have been approximately 6 inches deep, made of 2 in. material with 2x3 in. battens. The patterns should have been of at least 1 in. material properly braced. At the insistence of the customer, who assumed responsibility rather than lose time, the dies were cast and, as expected, they could not be used without costly maching. Just a few more dollars put into the pattern would have saved many dollars in the machine shop. We are now consulted beforehand on the pattern construction.

### Design Is Simplified

As an example of simplified design we previously made two castings to effect a certain unit installation, as shown in Fig. 2, left. The suggestion was made that the unit be cast in one piece, as in Fig. 2, right. Breakage was eliminated and the casting could be kept in service until it was worn out. The result was simplified molding, a stronger unit, a lower direct labor cost by 53 per cent.

Probably the most important rule in casting design is to adhere to a uniform thickness of section and to eliminate sharp corners wherever possible. Sharp corners breed cracks, and proper fillets should be used at all times, taking care not to use fillets large enough to materially increase the metal thickness and cause shrinkage because of the fillet. Uniform thickness will reduce the induction of internal stresses because of uneven cooling and will minimize shrinks and draws.

### Design Eliminates Shrinkage

A cast iron kettle was being produced from a special acid-resisting alloy metal, designed as in Fig 3, left. There was a shrinkage occurring in the top flange where a large side boss was cast adjacent to the flange. Proper risers would reduce the trouble but would not eliminate it. This boss was for a flange connection. The center hole was cored, thus eliminating drilling, and the outside of the boss was cut similar to a flanged pipe, as shown by Fig. 3, right. The metal was equalized in this manner and the trouble was overcome.

### Sprocket Design Changed

An inquiry was received for 18 in. P.D. heavy-duty chilled sprockets with an 11 in. face. The drawing called for a 2 in. thick hub, 1 1/16 in. center web, and 7/8 in. thick metal under the rim. In pouring these castings it is essential that the hot iron come to rest against the chiller as soon as possible to avoid flaws in the chilled surface.

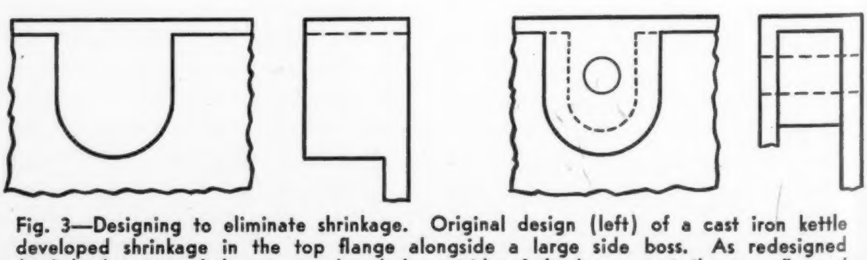


Fig. 3—Designing to eliminate shrinkage. Original design (left) of a cast iron kettle developed shrinkage in the top flange alongside a large side boss. As redesigned (right), the center hole was cored and the outside of the boss cut similar to a flanged pipe, thus equalizing the metal and overcoming the trouble.

To equalize the metal the hub thickness was reduced to 1¾ in. and drafted to 1½ in., the center plate was increased to 1¾ in. with 1 1/16 in. radius fillets, and the rim thickness was increased to 1⅜ in. at the center and drafted to 1⅛ in. thick. To further increase strength and to speed the rate of flow of the metal to the chiller, six 1¼ in. brackets were placed equally spaced on each side of the plate or center web. To further relieve stresses, these castings were placed in annealing pits at approximately 1400° F. and allowed to cool slowly for three days.

The above change in design, shown in Fig. 4, was readily

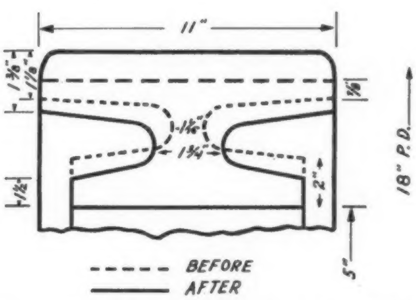



Fig. 4—How 18-in. heavy-duty chilled sprockets were redesigned to give superior products. To equalize the metal, hub thickness was reduced, center plate increased, and rim thickness increased. To further increase strength, brackets were spaced equally on each side of plate or center web, and stresses relieved by annealing and slow cooling.

approved by the customer and the sprockets proved to be far superior to those that they replaced. The drawing as first submitted had the dimensions of the original sprockets.

Beware of castings that try to incorporate too many features in the one casting. All parts may not be subjected to the same action, and the failure of a small part may scrap the whole unit. Also, by eliminating the troublesome part, the size of the mold can often be reduced and hence the cost will be reduced on a casting that will give better service.

### Chemical Casting Simplified

A simple example of this condition is a chemical process casting which incorporated with the main body section, which had to

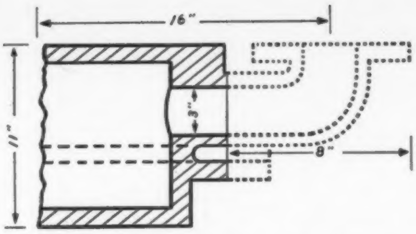



Fig. 5—Example of designing to eliminate a troublesome part, in this case a 90° inlet elbow in a chemical process casting. Formerly, the elbow always failed before the main body casting. Its elimination reduced direct labor in molding, core making and cleaning, and tripled service life of the part.

withstand acid fumes, a flanged 90° inlet elbow for introducing the hot liquid acid. The 90° elbow was always consumed before any appreciable corrosion was in evidence on the main body casting.

The pattern was changed, as illustrated in Fig. 5, to eliminate the elbow and the direct labor in molding, core making and cleaning was reduced on the body casting. A special high alloy acid-resisting elbow was used which could resist the hydraulic cutting action of the acid. In this way an installation was achieved that, in the long run, cost less than the original casting, and the apparatus was kept in operation approximately three times longer between replacements. The customer was pleased and consulted us further on apparatus that we had not previously furnished.

Patterns should be so designed that machined surfaces can be cast in the drag, if possible. Sufficient machining metal should be allowed to enable a cut to be taken below the skin or scale. Where sections are of unequal thickness, it has been found that the skin of the metal

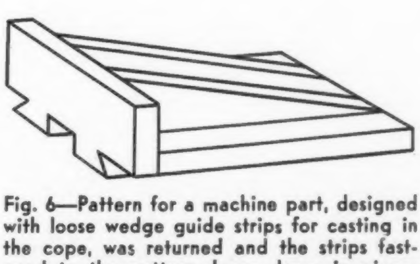


Fig. 6—Pattern for a machine part, designed with loose wedge guide strips for casting in the cope, was returned and the strips fastened to the pattern, loose draws in pieces being made for the wedge as shown. Top brackets were made loose and cast in the cope. Foresight would have eliminated the extra pattern expense the design change necessitated.

carries a large proportion of the stress set up in the casting. Hence, if highly accurate machining is to be done, these castings should be annealed and allowed to season after the roughing cut is taken.

### Cutting Extra Pattern Expense

The pattern for a machine part was delivered to the foundry with loose wedge guide strips for casting in the cope. This pattern was returned and the strips were fastened to the pattern and loose draws in pieces were made for the wedge, as shown in Fig. 6. The top brackets were made loose and were cast in the cope.

A little foresight would have eliminated this extra pattern ex-

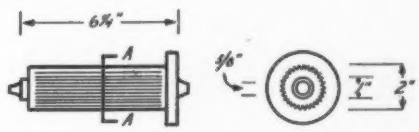



Fig. 7—A piece of machinery originally made of hardened tool steel and bronze bushed with oil grooves, was redesigned for production as a chilled iron casting with a gray iron bushing replacing the tool steel part with the bronze bushing. Thus a new use for cast iron was developed.

pense. However, if we had proceeded to furnish the castings with the pattern as offered to us we probably would have received a complaint that the machined surface would not clean up. In this instance the draw in pieces can only be eliminated by a core, but in all instances draw in pieces should be eliminated wherever possible, because draws in pieces are often hard to handle and a broken mold is hard to patch.

### Developing New Uses

New and novel applications for castings can be discovered when the designers' problems are appreciated by the foundryman. Be sure that your customers' engineers, as well as purchasing agents, know the various types of metal that you produce so that the proper casting can be made for its particular use.

I recall an indispensable piece of machinery which was made of

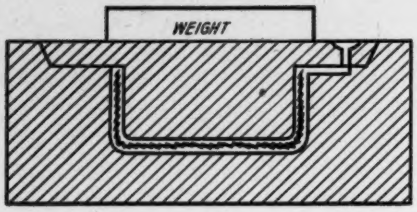



Fig. 8—Expensive cope and drag patterns furnished by a customer required machines a jobbing shop did not have, hence had to purchase the castings outside. To utilize its own equipment fully, the jobbing shop redesigned the casting to eliminate the cope, returned the work to its own shop and produced uniform castings at a cost below the price paid for the castings outside.

hardened tool steel and bronze bushed with oil grooves. However, so many of these articles were being used that replacements were developing into a sizeable item of operating expense. The procedure to make the article consisted of turning a steel blank, boring and milling the blank to have longitudinal teeth. This part was hardened and the bronze bushing installed. Flanges were then shrunk on the ends.

We offered to produce a chilled iron casting to replace this part, designed as illustrated in Fig. 7. It was necessary that the teeth be uniform and the body had to be round to replace the machined article. A machined steel stripping plate core box was made to form the teeth and a loose piece made the flange. A block with core prints was rammed up in the sand. The core was installed to form the outside of the casting and a center core of gray cast iron was placed in the center prints. The mold was poured with iron that would chill readily.

The customer had only to cut off the cast iron core prints, bore the center hole and cut the oil grooves, and he had a chilled casting with a gray iron bushing to replace the tool steel part with the bronze bushing. Thus a new use for cast iron was developed and these castings are being used today in quantities.

In the operation of a strictly jobbing foundry, as against a production shop, we have been reluctant to install costly production machinery with its attendant pattern and flask equipment to carry a few quantity jobs. Idle machinery is a greater problem than no machinery at all.

### A Jobbing Shop Problem

In one instance a customer furnished expensive cope and drag plate patterns to cast one casting per mold and we did not operate the proper type of machine to make use of the patterns. These castings were purchased by us from a production shop rather than to have installed the molding machine and to have been faced with stepping out of our field to sell enough production work to keep the machine busy. This arrangement was profitable but we were not pleased to lose the tonnage from our own heats.

In redesigning the job (Fig. 8), the hand molding patterns were equipped with core prints and fastened to a board. A core box was made to include the lift formerly in the cope and included a cover core vented and complete with a gate and pouring basin. In this way the cope was eliminated and the core was a convenient size to handle. The work was returned to our shop and we were producing uniform castings by hand at a cost that was materially below the price we had been paying the production shop for the castings.

### Where Foundry Troubles Begin

There probably are more pertinent examples than these to illustrate the problems caused by casting design, because every casting is a separate problem, and you yourselves know how to solve these problems. If foundrymen find themselves in trouble trying to make poorly designed castings, they have no one to blame but themselves because they accepted the business without question. Foundrymen themselves will have to exert the pressure to eliminate faulty casting design and in this way reduce their losses and improve their products.

Most of a foundry's troubles begin with inquiries and patterns, and there is the place to eliminate trouble before it gets on the molding floor. In this way casting problems caused by design can be greatly reduced.

## Retires After 37 Years With One Foundry Firm

CARL F. SCHLUNDT, for the past 13 years Assistant Comptroller, American Steel Foundries, and connected with that firm since 1905, retired from active service November 1. After graduation from high school, two years teaching in a country school, and two years at the University of Wisconsin, Mr. Schlundt began his business career as a clerk in a bicycle manufacturing plant in Milwaukee, later transferring to Cleveland.

He was appointed Chief Clerk at the Alliance works, American Steel Foundries, in 1905, being transferred to the Chicago office in 1912 as auditor of costs in the Accounting department. Appointed assistant to the Comptroller in 1916, he was elected Assistant Comptroller in March 1929. Mr. Schlundt is going to California to join his son, for several years connected with the foundry industry and now with Douglas Aircraft Corp.

## WPB Stresses Need for Industrial Scrap

IN EMPHASIZING the vital need for scrap in our war production effort, Donald M. Nelson, chairman of W.P.B., recently asked all business and industrial concerns to "dig deep and then even deeper" for scrap materials. He pointed out that the amount of scrap obtained in the entire drive depends in large measure on industrial scrap, and urged executives to set up definite organizations for this purpose.

"It is," he said, "the job of every president, purchasing agent, salvage manager, plant superintendent, shop foreman and workman to dig deep and then even deeper for dormant as well as production scrap. Every plant must undergo a thorough,

old-fashioned house cleaning. Storerooms and rubbish piles will reveal tons of old, worn-out equipment and stocks, broken-down machinery and discarded tools. All such scrap materials are wanted badly.

"Although plant executives may feel that every effort has been made to move scrap from their plant, they should search again and again to make certain that nothing is overlooked. Even if it is only a small item, that item may help save a soldier's life."

#### Goal of 12,000,000 Tons

WPB is shooting for a goal of at least 12,000,000 tons of scrap from industrial firms for the last half of 1942, and to reach that goal before winter, when normal supplies of scrap fall off. Some 70,000 industrial firms are being contacted to move dormant scrap and to make complete disposal of such materials through regular scrap dealer channels as rapidly as possible.

Dormant scrap is defined as obsolete machinery, tools, equipment, dies, jigs, fixtures, etc., which are incapable of current or future use *in the war production effort* because they are broken, worn out, irreparable, dismantled, or in need of unavailable parts. Industrial firms also are being urged to speed up the return of manufacturing scrap.

# Procedure for the Securing of Aluminum for Matchplates

SINCE the start of priorities, and especially since the start of the Production Requirements Plan, considerable confusion has seemed to exist as to the information necessary to secure aluminum for matchplate pattern equipment. The following will clarify many misunderstandings.

Paragraph (G-3) of Priorities Regulation No. 11 reads as follows: "The provisions of this Regulation do not relieve PRP Units from compliance with the terms of any order of the Director of Industry Operations controlling the distribution or restricting the use of any specific material."

#### Aluminum Allocated

The now customary certifications used under Regulations Nos. 3 and 11 *do not cover matchplates* because aluminum is a critical material and is allocated solely by the Aluminum and Magnesium Branch, War Production Board. The last order (M-1-I), governing the use of aluminum for matchplates, was issued August 18, 1942 and we quote paragraph (g)-15 of this order:

"Within the limits of available aluminum and fabricating facilities, the Director will authorize the essential requirements for the manufacture of the following eligible items: Matchplates, patterns, core boxes, core dryers, and snap flasks; PROVIDED, That the customer certifies in writing to the manufacturer that their use is essential to the fulfillment of quantity production orders bearing priority ratings higher than A-2. However, a manufacturer may use aluminum to make new pattern equipment, provided that the customer certifies that the new equipment will be used to fulfill quantity production orders bearing A-10 or higher priority ratings, and that he will supply an equivalent weight of defective or obsolete aluminum equipment, and upon approval on Form PD-26 the manufacturer may melt such scrap notwithstanding the provisions of Supplementary Order M-1d."

To make matchplates for castings for parts rated higher than A-2, it will not be necessary to secure or make any extension of contracts, but the following certification should accompany your order:

> This is to certify that Matchplate ordered herein is required to be lightweight and is for quantity production of castings rated ..............................
> Contract No. ..............................
> Certificate No. ..............................
> Name of Part is..............................
> ..............................
>
> Note: If made under Production Requirement Plan insert P. No. and Serial No. in place of Contract and Certificate No.

Matchplates for castings for parts rated A-2 to A-10 inclusive may be made if the above information is furnished to the pattern manufacturer and if defective or obsolete aluminum patterns equal in weight to the weight of the plate to be made, plus 10% to allow for shrinkage, also is supplied.

This method of certification has had the approval of the Aluminum and Magnesium Branch, War Production Board, and must accompany orders, as shipments of matchplates cannot be made until this detailed information (and material, if required) is in the hands of the pattern shop making the job.

EDITOR'S NOTE: The above information has been secured by M. E. Kohler, The Scientific Cast Products Corp., Cleveland, Ohio, who has spent considerable time and effort to secure aluminum for the manufacture of pattern equipment. The pattern and foundry industries owe Mr. Kohler their thanks for his assistance in the solution of this important problem.

### Representative of Hercules Powder Dies

ANNOUNCEMENT has been received of the death on August 31 of Ed Weatherford, foundry representative of Hercules Powder Co. in the Midwest district since 1936. Mr. Weatherford's foundry experience dated back many years, having at various times been associated with American Steel Foundries, East Chicago, Ind.; Ohio Steel Foundry Co., Lima, Ohio; Hubbard Steel Foundry Division of Continental Roll & Steel Foundry Co., and Sterling Steel Casting Co., East St. Louis, Ill.

Joining the Hercules organization in 1936, Mr. Weatherford played an active part in applying pine resins to wider use in foundry practice. For several years he was connected with the Borden Company, where he assisted in developing a line of foundry materials based on milk casein. He became connected with Hercules Powder Co. in 1936, making his home in Decatur, Ill.

# Second Foundry Congress of Present War To Be Held at St. Louis in April

**Management, Technical and Operating Men of Foundry Industry to Mobilize at 1943 Meeting to Devise Ways and Means for Increasing the Industry's Contribution to the War Effort.**

THE Board of Directors of your Association has chosen St. Louis as the site of its 47th annual meeting to be held April 28, 29, 30, 1943. The 1943 annual meeting of A.F.A. will be the first National gathering of foundrymen to be held in St. Louis.

This meeting will be an all-out effort to strengthen and increase the foundry industry's contribution to the war effort and to complete victory. Management, technical and operating men will mobilize to study and devise ways and means for extending the use of cast metals in the war effort.

The aims of this Second Foundry Congress to be staged during the present war are a logical followup of those of the First Western Hemisphere Foundry Congress staged in Cleveland last April. That congress, the first one held during the present war and which was the most important and successful event thus far staged by and for the foundry industry, both from the standpoints of accomplishment and attendance, was an all-out effort to increase the production of war materials.

The City of St. Louis was chosen as the site of the 1943 Foundry Congress because it is one of the leading foundry centers in the country and has increased in importance as a castings producing center since the beginning of the war. Easily accessible by all available modes of transportation from all sections of the country, St. Louis is particularly accessible to foundrymen whose plants are located in the south and southwest portions of the United States.

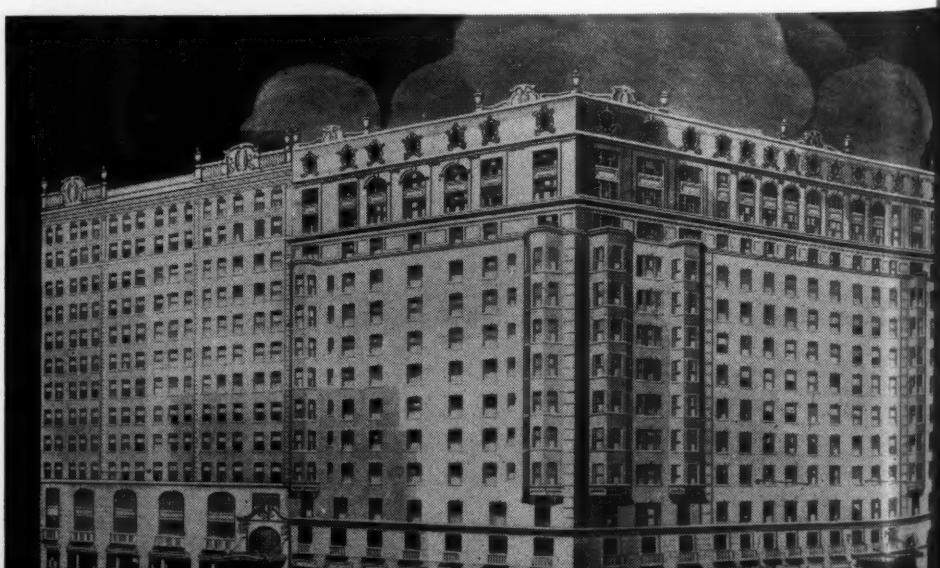
The beautiful lobby of the Hotel Jefferson, St. Louis, where foundrymen from all over the country will gather April 28-30, 1943, for a vital 3-day War Production Foundry Congress and the Annual Convention of American Foundrymen's Association.

Because of this fact, it is anticipated that a large number of foundrymen from these areas, many of whom have never been able to attend an A.F.A. National meeting before because of the great distances from their plants to cities in which such meetings previously have been held, will attend and participate in the 1943 meeting.

Hotels Jefferson and Statler have been designated as joint headquarters for the meeting, with registration headquarters located at Hotel Jefferson. The St. Louis Chapter of A.F.A., who have persistently sought since organization in 1935 to secure the national convention, will be host to the foundrymen of America.

Because of the importance of this meeting to the industry and

Headquarters for the Second War Production Foundry Congress of A.F.A., to be held in St. Louis next April, will be the Jefferson Hotel (below) and the Hotel Statler.



its participation in the war effort, work has begun early on the program for this second War Production Congress, which will be staged without commercial exhibits. Present plans are flexible so as to take care of last-minute changes made necessary by current problems.

Government cooperation is assured in staging the meeting, and it is anticipated that many sessions will be "off the record" ones where specific information may be obtained. An excellent technical program dealing with subjects of vital interest to the production of castings for war purposes is in preparation.

Further information on plans for the 1943 Annual Meeting of your Association will be published in future issues of *American Foundryman.*

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"Suggestion Systems—Putting Employees' Ideas to Work" is the title of a report issued by the Policyholders Service Bureau, Metropolitan Life Insurance Co.

## Advises on Publishing Papers During Wartime

TO ASSIST authors and editors to avoid publishing technical data which may become of assistance to our wartime enemies, a special Advisory Committee on Scientific Publications has been formed by the National Academy of Sciences and the National Research Council. The committee is prepared to advise on the procedure to follow when manuscripts in this category are

# John Bolton Selected to Be First Foundation Lecturer

THE Board of Awards in releasing information on establishment of the A.F.A. Foundation Lecture, announces that John W. Bolton, A.F.A. Medallist and director of metallurgical research, The Lunkenheimer Company, Cincinnati, Ohio, has been selected to give the first lecture before the 1943 Annual Foundry Congress to be held at St. Louis, April 28, 29, 30. The Foundation Lecture has been established to have outstanding technical lectures presented to the foundry industry covering important metallurgical developments and trends of the casting industry.

The selection of John Bolton, one of the world's outstanding metallurgists, to present the first of these lectures is most fortunate, and his lecture will be a most important feature of the 1943 Convention. Mr. Bolton was awarded the John A. Penton Gold Medal of the Association in 1937 in recognition of his outstanding contribution in the field of metallurgy and his practical application of research findings to the advancement of the industry.

### 24 Years of Metallurgy

Mr. Bolton has been continuously engaged in metallurgical and research work since he was graduated from Rose Polytechnic Institute, Terre Haute, Ind., in 1918. His work has been variously recognized by further degrees from his own college, namely, Master of Science in 1921 and Honorary Chemical Engineer in 1925. He also has been made a member of Sigma Xi at the University of Cincinnati. He is a member of A.F.A., A.S.T.M., A.I.M.M.E., A.S.M. and the Int. Society for Testing Materials.

He has served as chemist for Proctor and Gamble Co., Kansas City and Cincinnati; Metallurgist, Niles-Bement-Pond Co., Hamilton, Ohio; and Frank Foundries Corporation, Moline, Ill., and at present is Chief Chemist and Metallurgist of The Lunkenheimer Company.

Mr. Bolton's work in connection with the American Foundrymen's Association has embraced both gray iron and non-ferrous investigations, and numerous papers and committee reports have been presented under his direction. Outstanding among these are the following: "Graphite in Gray Iron," "Notes on Composition and Structure of A.S.T.M. Bar," "Some Graphite Formations in Gray Cast Iron," and "Research Problems in Gray Cast Iron." He is chairman of the sub-committee which developed the General Gray Iron Specifications A 48-36 of the A.S.T.M.

### Work Covers Several Fields

He also has worked on various committees of the American Society for Testing Materials, and as special representative of the Manufacturers Standardization Society of the Valve and Fittings Industry. He was the author of A.F.A. Exchange papers for the 1925 meeting of the Belgian Foundrymen's Association and the 1929 meeting of the Institute of British Foundrymen. Other publications include a wide range of articles in technical and engineering magazines and a recently published book, "Gray Cast Iron."

In the Lunkenheimer Company laboratories which Mr. Bolton directs, research has developed a number of outstanding advancements including non-cracking, age-hardening alloys, and a number of ferrous and non-ferrous alloys for high-temperature service.

submitted for publication, or question is raised concerning an investigation in progress. While the procedure will delay publication in some cases, in others it will facilitate publication of results that might otherwise be held up through uncertainty as to possible military significance.

### To All A.F.A. Authors

The Secretary of A.F.A. urges all authors and prospective authors of papers intended for Association meetings not to hesitate to prepare their data because of any fear that they will not pass the censorship. To all such authors the following is strongly urged: If your data will help us win the war, write it, send it in to the A.F.A. and your Association will have it passed on by the Advisory Committee on Scientific Publications.


This idea of Caterpillar Tractor Co., Peoria, Ill., in setting up scrap tables on which faulty pieces are displayed and identified as to fault, might well be adapted by many other plants in cutting scrap losses and thereby speeding up war production work. One result of this "scrap table" plan, it is reported, is the growing difficulty in finding sufficient rejected pieces for frequent change of displays.

## Caterpillar Forges Ahead with "Pincers-Move" to Reduce Scrap

A UNIQUE method of combatting the problem of scrap losses has been developed by Caterpillar Tractor Co., Peoria, Ill., in promoting the urgency of war needs throughout the plant. The program was devised by the firm's Salvage Committee and, aiming at production perfection, consists of three essential steps, as follows:

1. Personal talks with the men on the job, impressing the importance of individual action to make every piece right.
2. Scrap tables set up in different departments to "put the bite" on faulty workmanship by actual displays of rejected pieces, each carded to describe whether the fault was that of the machine operator, supervisor, or inspector.
3. Special instruction of supervisors to help operators turn out better work and avoid errors, in some cases resulting in rechecking of jigs and fixtures, dies, etc.

That the 3-prong campaign is succeeding is shown by a drop of almost 50 per cent in tool scrap in one division and material reductions in scrap losses in other divisions.

The three-way scrap reduction drive was worked out by Lyman Thunfors, general superintendent of Caterpillar foundry and co-chairman of the Labor-Management War Production Committee, with Leonard C. Feldman of the firm's Salvage Committee.


Workmen of the Caterpillar Tractor Co., Peoria, Ill., examining rejected pieces displayed on special "Scrap Tables" in the company's drive to eliminate scrap losses throughout the plant. Pieces are tagged to indicate whether the rejection was due to machine operators, supervisors, or inspectors, thereby promoting more careful workmanship, since each man strives not to have his own work exhibited on such tables.

### Book Review

*Molding Sands of Michigan and Their Uses, by G. G. Brown, Michigan Department of Conservation, Geological Survey Div., Publication 41, Geol. Sci. 35, 1936, 254 pages.* The report is divided into two parts, first part dealing with the geology of sand deposits, prospecting for and excavating sand, minerals in sand, and physical properties. In the last part the author has freely abstracted available literature. Sand control and reclamation are briefly treated, and this is followed by a description of the various uses of sand and Michigan sand deposits.

# Rapid Methods of Analysis for Sand Control in Magnesium Foundries

By Eugene M. Cramer,* Pullman, Wash.

**When inhibitors are present in improper quantities in magnesium foundry sands, they have a detrimental effect not only on the metal itself but also jeopardize the production of quality castings. Therefore it is essential that the quantity of inhibitors present be controlled. The author in the following paper suggests chemical methods to accomplish this control.**

INHIBITORS are a necessary part of magnesium foundry sand in modern practice. Insufficient quantities result in a reaction between the molten metal and both the moisture in the sand and the sand itself. The effects appear on the thickest sections, and at points where the greatest amount of metal flows through the mold.

Their function is accomplished[1] by (1) forming an enveloping protective atmosphere, (2) forming a protective skin on the flowing metal by reaction, (3) isolating the sand grains with fused products, and (4) by locally lowering temperatures by their heats of fusion or vaporization.

Sulphur is the most important inhibitor, and is probably of the first type, that is, a protective atmosphere is formed. Ammonium fluosilicate is of the second type, giving a surface on the casting resistant to oxidation. Boric acid acts as types 2 and 3, forming a skin and isolating the sand grains.[2]

Two main types of sand are in common use. Type A contains 2 to 10 per cent sulphur, 0.5 to 1 per cent boric acid, 2 to 4 per cent bentonite, about 1 per cent diethylene glycol, about 4 per cent water, and the balance silica sand. Type B contains 2 to 10 per cent sulphur, 0.5 to 1 per cent boric acid, 2 to 4 per cent bentonite, 2 to 4 per cent ammonium fluosilicate, about 5 per cent water, and the balance silica sand.

The degree of control necessary is obtained by adding the requisite amounts of bonding and inhibiting materials to silica sand, and by frequent routine analyses. The need for a rapid and reasonably accurate method for handling these analyses was pointed out by H. P. Nielsen, Metallurgist for Kinney Aluminum Co., Los Angeles, and his counsel and advice has been of great value in selecting the procedures.

*Junior Research Metallurgist, Washington State College Mining Experiment Station.

These routine methods have been selected carefully and tried out in order to eliminate time consuming separations and filtrations, and to allow over-lapping of the determinations by using separate samples for each substance where convenient.

### Analysis of Sand A

WATER

Dry a sample of the sand in an oven at 90-95° C. (194-203°F.) for an hour and calculate per cent of water direct. For a 10 gram sample: (loss of weight) $\times$ 10 = per cent water.

BORIC ACID[3]

*Reagents: 0.5 N NaOH.* Prepare by dissolving 22 gm. of NaOH in 300 ml (milli-liters) distilled water, add 20 ml of 0.5 normal $BaCl_2$, settle, and decant into 1,000 ml volumetric flask. Fill to mark with boiled, distilled water, settle again and siphon off the clear liquid into a bottle protected by a soda-lime tube. Standardize against a standard acid, using phenolphthalein as indicator.

*Phenolphthalein Indicator.* Dissolve 1 gram phenolphthalein in 50 ml ethyl alcohol, and add 50 ml water.

*Procedure:* Place 10 gram sample in 250 ml Ehrlenmeyer and treat with 50 ml water until acid is dissolved. Add 20 ml glycerine; 4 drops indicator, and titrate to a permanent end point with NaOH. Add 10 ml glycerine again, and if the end point fades, continue the titration.

*Reaction:* Boric acid reacts as a monobasic acid, and 1 mol $H_3BO_3$ is equivalent to 1 mol NaOH.

*Calculation:* 1 ml 0.5 N NaOH = 0.0309 gms. $H_3BO_3$.

DIETHYLENE GLYCOL[4,5,6,7,8]

*Reagents: Acetic anhydride-pyridine solution.*

Prepare by mixing 88 ml colorless pyridine with 12 ml acetic anhydride. This should be prepared fresh for each group of determinations.

*0.5 N NaOH.*

*Phenolphthalein.*

*Procedure:* Place a 10 gram sample, which has been thoroughly dried, in a 250 ml Ehrlenmeyer flask. Pipet 20 ml of acetic anhydride-pyridine solution into the flask, and prepare a blank of 20 ml in another flask. Attach reflux condensers and boil gently for a few minutes on a hotplate, then wash out the condenser and sides of the flask with 50 ml water. Cool the flasks, and titrate cold with NaOH, using phenolphthalein as an indicator. Add 20 ml glycerine and continue titration as for boric acid.

*Reaction:* The acetic anhydride reacts with the glycol by acetylation of hydroxyl groups, and the remaining anhydride is decomposed by the addition of water to acetic acid. The acetic acid is titrated with NaOH.

*Calculation:* (Blank ml − (ml used) + (ml from boric acid determination) = ml equivalent to acetic anhydride reacted.

1 ml 0.5 N NaOH = 0.0265 grams diethylene glycol.

SULPHUR[9,10]

*Reagents: Sodium sulfite ($Na_2SO_3$)*

*40% solution, by vol., of formaldehyde (HCHO)*

*20% solution of acetic acid ($HC_2H_3O_2$)*

*0.1 N Iodine solution*

Prepare by dissolving 12.7 grams $I_2$ in 100 ml water containing 21.0 grams KI. Stir

until dissolved. Transfer to 100 ml volumetric flask and dilute to mark. Store in a glass stoppered bottle in a dark place. Standardize against $As_2O_3$. Weigh 0.1000 grams $As_2O_3$ into small beaker, and dissolve in 10 ml 5% NaOH by warming gently. Acidify with HCl, add an excess of $NaHCO_3$, and titrate with iodine solution, using starch indicator.

*Starch Indicator.* Prepare by grinding 1 gram of soluble starch into a thin paste in an agate mortar with a small amount of water. Wash into 150 ml boiling water, boil for 4 min. Filter if necessary. Fresh solution each day.

*Procedure:* Place 10 gram sample in a Kjeldahl flask, or a round-bottom flask of about 300 ml capacity with reflux condenser (a motor stirrer with a long glass paddle is necessary to prevent bumping). Add 75 ml water, 4 grams $Na_2SO_3$ and boil for 45 minutes to 1 hour until the sulphur is dissolved as a thiosulfate.

Cool, and transfer to a 250 ml volumetric flask, add 40 ml of formaldehyde solution, 10 ml of acetic acid solution, and fill to mark with repeated washings of the flask and sand. Titrate immediately.

Pipet 25 ml into a 250 ml Ehrlenmeyer flask and titrate rapidly with $I_2$. When titration is nearly completed (brown color fades slowly) add 5 ml starch solution and titrate to blue color. The end point fades due to decomposition of the formalin-sulfite compound.

*Reaction:* Standardization of $I_2$:

$As_2O_3 + 4NaOH = 2Na_2HAs_2O3 + H_2O.$

$Na_2HAs_2O_3 + I_2 + 2NaHCO_3 = Na_2HAsO_4 + 2NaI + 2CO_2 + H_2O.$

Titration of thiosulfate:

$2Na_2S_2O_3 + I_2 = Na_2S_4O_6 + 2NaI.$

*Calculation:* 0.1000 gram $As_2O_3$ = 0.2565 grams $I_2$.

1 ml 0.1 N $I_2$ = 0.0032 grams S.

SULPHITE AND SULPHATE IN USED SAND

*Reagents:* *Lorol amine hydrochloride DP243 (Du Pont)*
*Bromine water*
*10% solution of $BaCl_2$*

*Procedure:* To a 10 gram sample, add 50 ml water and heat to dissolve sulphates, add 2 drops DP243 to precipitate bentonite, and mix thoroughly. Filter by suction, wash with water, and discard residue. Acidify the filtrate with HCl, add 5 ml of bromine water and boil until $Br_2$ is expelled. Add 20 ml of 10% $BaCl_2$ solution slowly from a buret, and digest for 1 hour on a water bath. Filter through a weighed Gooch crucible (or No. 42 filter paper) wash with hot water, dry, and ignite gently to constant weight. Weigh as $BaSO_4$.

*Calculation:* $BaSO_4 \times 0.1373 = S$.
$BaSO_4 \times 0.4115 = SO_4$

### Analysis of Sand B

The determination of moisture and sulphur is by the same methods as with sand type A.

BORIC ACID [11, 12]

*Reagents:* *0.5 N NaOH*
*Glycerine—($C_3H_5(OH)_3$)*
*$BaCl_2$*
*Phenolphthalein*

*Procedure:* Place 10 gram sample in a 250 ml Ehrlenmeyer flask, add 20 ml water, 1 gram of $BaCl_2 \bullet 2H_2O$ to precipitate the fluosilicate, and shake until dissolved. Wash down the sides of the flask and leave overnight.

Add phenolphthalein and titrate carefully with NaOH to the first tinge of pink (fades), being careful not to overstep. Note the buret reading now. Add 20 ml of glycerine and titrate the boric acid with NaOH to a permanent end point.

AMMONIUM FLUOSILICATE [13, 14]

*Reagents:* *0.5 N NaOH*
*Glycerine—($C_3H_5(OH)_3$)*
*Phenolphthalein*

*Procedure:* Place 10 gram sample in a 250 ml Ehrlenmeyer flask, add 50 ml water, and heat nearly to a boil. Add phenolphthalein and titrate to pink while hot. Cool the solution, add 20 ml of glycerine and titrate to a permanent pink. Both $H_3BO_3$ and $(NH_4)_2SiF_6$ are neutralized.

*Reaction:* Apparently $(NH_4)_2SiF_6 + 4NaOH = 2NH_4F + 4NaF + SiO_2 + 2H_2O$

*Calculation:* (Ml used) − (ml used for boric acid = ml equivalent to $(NH_4)_2SiF_6$.

1 ml 0.5 N NaOH = 0.0223 grams $(NH_4)_2SiF_6$.

In the titration of boric acid in the presence of precipitated barium fluosilicate, a part of the acid is neutralized in the first addition of sodium hydroxide, and as a result, the fluosilicate figure will consistently be high and the boric acid low by about 5 per cent. It is believed, however, that the methods are sufficiently accurate to allow efficient control of foundry sands.

By the use of these methods it is possible to obtain a complete analysis of all inhibitors including sulphate in less than 2 hours by a single operator, if the precipitation of fluosilicate has been allowed to stand overnight.

### Bibliography


[1] Beck, Dr. Adolph, TECHNOLOGY OF MAGNESIUM AND ITS ALLOYS, F. A. Hughes and Co., Ltd., London, p. 324, 1940.

[2] *"Moulding Sands for Magnesium Alloys,"* LIGHT METALS, vol. 4, No. 45, October, 1941, pp. 206-08.

[3] Thomson, R. T., *"New Aspects of Phenolpthalein as an Indicator,"* JOURNAL OF SOCIETY OF CHEMICAL INDUSTRIES, vol. 12, pp. 432-33, 1893.

[4] Fried, M., and Wynne, A. M., *"Determination of Hydroxyl Groups in Organic Compounds,"* INDUSTRIAL AND ENGINEERING CHEMISTRY, vol. 8, pp. 278-9, 1936.

[5] Verly, A., and Bolsing, F., BER. CHEM. GES., vol. 34, pp. 3354-59, 1901.

[6] Peterson, V. L., and West, E. S., *"The Volumetric Estimation of Hydroxyl Groups in Sugars and other Organic Compounds,"* JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 74, p. 379, 1927.

[7] West, E. S., Hoagland, C. L., and Curtis, G. H., *"An Improved Method for the Determination of Acetyl Values of Lipids Applicable to Hydroxylated Fatty Acids,"* JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 104, pp. 627-34, 1934.

[8] Lewkowitz, JOURNAL OF PROCEEDINGS OF CHEMICAL SOCIETY, vol. 6, pp. 72-91, 1890.

[9] Fleck, H. R., and Ward, A. M., QUARTERLY JOURNAL OF PHARMACY, vol. 6, p. 431, 1933; vol. 7, pp. 179-81, 1934.

[10] Kurtenacker and Bittner, ZEITSCHRIFT FUR ANORGANISCHE CHEMIE, vol. 142, p. 115, 1925.

[11] Hart, L., *"Analysis of Insecticides Containing Fluorine Compounds,"* INDUSTRIAL AND ENGINEERING CHEMISTRY, vol. 1, pp. 133-35, 1929.

[12] Katz, CHEM. ZTG., vol. 28, pp. 356-87, 1904.

[13] Worthington, K. K., and Haring, M. H., *"Methods for Determining the Solubilities of Some Fluosilicates,"* INDUSTRIAL AND ENGINEERING CHEMISTRY, vol. 3, pp. 7-9, 1931.

[14] Jacobson, J., *"Method of Titrating and Properties of Fluosilicic Acid,"* JOURNAL OF SOCIETY OF CHEMICAL INDUSTRIES, vol. 12, p. 432, 1893.

# A.S.T.M. Tentative Specifications for Magnesium-Base Alloy Castings

THESE specifications cover commercial magnesium-base alloy sand castings having a specific gravity of 1.9 or less. Six types of alloys are specified and are designated alloys Nos. 2, 3, 4, 11, 14, and 17.

*Alloy No. 2* has a specific gravity of about 1.81. It is used both in the solution heat-treated condition (heat treatment No. 1) and in the solution heat-treated and aged conditions (heat treatments Nos. 2 and 3). Aging increases the yield strength and hardness and decreases the toughness and elongation. The copper and nickel contents should be kept low to minimize corrosion.

*Alloy No. 3* has a specific gravity of about 1.82. It is used in the solution heat-treated and aged condition (heat treatment No. 3) for castings requiring the maximum obtainable yield strength. Toughness and elongation are low. The copper and nickel contents should be kept low to minimize corrosion.

*Alloy No. 4* has a specific gravity of about 1.84. It is used in the as-cast, the solution heat-treated (heat treatment No. 1), and the solution heat-treated and aged (heat treament No. 3) conditions. Its properties are somewhat better and its resistance to salt-water (NaCl) corrosion is decidedly better than in the case of alloys No. 2 and 3. The copper and nickel contents should be kept low to minimize corrosion.

*Alloy No. 11* has a specific gravity of about 1.76. It is used principally for aircraft tank fittings where a weldable alloy with high resistance to salt-water (NaCl) corrosion is required. The copper and nickel contents should be kept low to minimize corrosion.

*Alloy No. 14* has a specific gravity of about 1.82. It is used in the solution heat-treated and aged condition for castings requiring the maximum obtainable yield strength. Its physical properties are very similar to those of alloy No. 3 but its resistance to salt-water (NaCl) corrosion and its heat-treating characteristics are somewhat better. The copper and nickel contents should be kept low to minimize corrosion.

*Alloy No. 17* has a specific gravity of about 1.82. It is used where maximum pressure tightness is required. The alloy is heat treatable and is then characterized by high strength and hardness. Its resistance to salt-water (NaCl) corrosion is approximately equivalent to that of alloy No. 4. The copper and nickel contents should be kept low to minimize corrosion.

Alloy No. 17 in the heat-treated condition ages more rapidly than alloy No. 4 in the heat-treated condition. Under service conditions where the castings attain a temperature of 200° F. or higher, the castings of alloy No. 17, heat-treated, will gradually change to the heat-treated and aged condition.

*Alloys Nos. 4X and 17X* are the same as alloys Nos. 4 and 17, respectively, except that the iron and nickel contents are held to low values in order to obtain maximum resistance to salt-water (NaCl) corrosion. Resistance to normal atmospheric corrosion is not materially increased. Mechanical properties are the same as for the normal grades of alloys. These high-purity alloys are available from limited sources of supply and at a premimum over the normal grades of alloys.

### Heat Treatment

The castings may be subjected to such heat treatment as the manufacturer desires to produce material that will conform to the requirements specified. Heat treatment shall be performed on the whole of a casting, never on a part only, and shall be applied in a manner that will produce the utmost uniformity.

TABLE I.—CHEMICAL REQUIREMENTS.

NOTE 1.—Analysis shall regularly be made only for the elements specifically mentioned in this table. If, however, the presence of other elements is suspected, or indicated in the course of routine analysis, further analysis shall be made to determine that the total of these other elements is not in excess of the limits specified in the last column of the table.

NOTE 2.—The following applies to all specified limits in this table: For purposes of acceptance and rejection, an observed value or a calculated value obtained from analysis should be rounded off to the nearest unit in the last right-hand place of figures used in expressing the specified limit.

| Alloy | Magnesium, per cent | Aluminum, per cent | Manganese, min., per cent | Zinc, per cent | Silicon, max., per cent | Copper, max., per cent | Nickel, max., per cent | Iron, max., per cent | Other Impurities, max., per cent |
|---|---|---|---|---|---|---|---|---|---|
| No. 2 | remainder | 9.0 to 11.0 | 0.10 | 0.3 max. | 0.3 | 0.05 | 0.03 | ...... | 0.3 |
| No. 3 | remainder | 11.2 to 12.8 | 0.10 | 0.3 max. | 0.3 | 0.05 | 0.03 | ...... | 0.3 |
| No. 4 | remainder | 5.3 to 6.7 | 0.15 | 2.5 to 3.5 | 0.3 | 0.05 | 0.03 | ...... | 0.3 |
| No. 4X | remainder | 5.3 to 6.7 | 0.15 | 2.5 to 3.5 | 0.3 | 0.05 | 0.005 | 0.005 | 0.3 |
| No. 11 | remainder | ...... | 1.20 | ...... | 0.3 | 0.05 | 0.03 | ...... | 0.3 |
| No. 14 | remainder | 9.0 to 11.0 | 0.10 | 0.5 to 1.5 | 0.3 | 0.05 | 0.03 | ...... | 0.3 |
| No. 17 | remainder | 8.3 to 9.7 | 0.10 | 1.6 to 2.4 | 0.3 | 0.05 | 0.03 | ...... | 0.3 |
| No. 17X | remainder | 8.3 to 9.7 | 0.10 | 1.6 to 2.4 | 0.3 | 0.05 | 0.005 | 0.005 | 0.3 |

### Chemical Composition

The castings shall conform to the requirements as to chemical composition prescribed in Table 1.

### Sampling for Chemical Analysis

The sample for chemical analysis shall be taken by sawing, drilling, or milling the casting or tension test specimen in such a manner as to be representative of its average cross-section. The sample shall weigh not less than 50g.

The saw, drill, or cutter used

TABLE II—TENSILE REQUIREMENTS

| Alloy | Condition | Tensile Strength, min., psi. | Yield Strength* (0.2 per cent offset). min., psi. | Elongation in 2 in., min., per cent |
|---|---|---|---|---|
| No. 2 | Heat treated and aged | 29 000 | 17 000 | not required |
| No. 3 | Heat treated and aged | 27 000 | 17 000 | not required |
| No. 4 and 4X | As cast | 24 000 | not required | 4 |
| | Heat treated | 32 000 | not required | 7 |
| | Heat treated and aged | 34 000 | 16 000 | 3 |
| No. 11 | As cast | 12 000 | not required | 3 |
| No. 14 | Heat treated and aged | 30 000 | 19 000 | not required |
| No. 17 and 17X | As cast | 20 000 | not required | not required |
| | Heat treated | 32 000 | not required | 6 |
| | Heat treated and aged | 34 000 | 18 000 | 1 |

for taking the sample shall be thoroughly cleaned. No lubricant shall be used in the operation, and the sawings or metal chips shall be carefully treated with a magnet to remove any particles of iron introduced in taking the sample.

### Tensile Properties

The tension test specimens representing the castings shall conform to the requirements as to tensile properties prescribed in Table 2.

The yield strength of magnesium-base alloys is defined as the stress at which the stress-strain curve deviates 0.2 per cent from the modulus line. It may be determined by the "Offset Method" or the "Extension Under Load Method" (the latter is often referred to as the "Approximate Method Without the Stress-Strain Diagram") as described in the Tentative Methods of Tension Testing of Metallic Materials (A. S. T. M. Designation: E 8) of the American Society for Testing Materials.

The tension test specimens shall be separately cast in green sand and shall be "cast to size" according to the dimensions shown in Fig. 1. If the castings are heat treated, the tension test specimens representing such castings shall be similarly heat treated. They shall not be machined prior to test except to adapt the grips to the holders of the testing machine in such a manner as to assure an axial load.

The tests shall be made, so far as possible, by heats or melts, but unless otherwise agreed upon

TABLE III
Typical and Minimum Strength Values for the Various Alloys.

| Alloy | Condition | Typical or Minimum | Yield Strength (0.2 per cent offset), min., psi. | Unit Deformation, inch per inch of gage length |
|---|---|---|---|---|
| No. 2.... | Heat treated and aged... | typical | 19 000 | 0.0049 |
| | | minimum | 17 000 | 0.0046 |
| No. 3.... | Heat treated and aged... | typical | 21 000 | 0.0052 |
| | | minimum | 17 000 | 0.0046 |
| No. 4 and 4X.... | As cast........ | typical | 11 000 | 0.0037 |
| | Heat treated.. | typical | 11 000 | 0.0037 |
| | Heat treated and aged... | typical | 19 000 | 0.0049 |
| | | minimum | 16 000 | 0.0045 |
| No. 11.... | As cast........ | typical | 4 000 | 0.0026 |
| No. 14.... | Heat treated and aged... | typical | 22 000 | 0.0054 |
| | | minimum | 19 000 | 0.0049 |
| No. 17 and 17X | As cast........ | typical | 14 000 | 0.0042 |
| | Heat treated.. | typical | 14 000 | 0.0042 |
| | Heat treated and aged... | typical | 20 000 | 0.0051 |
| | | minimum | 18 000 | 0.0048 |

by the manufacturer and the purchaser, two tension tests shall be made for each unit of 500 lb. or fraction thereof.

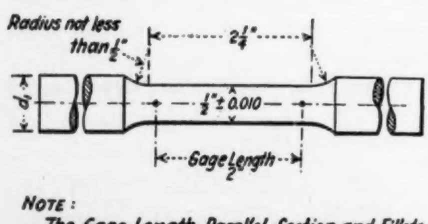
If any tension test specimen is improperly machined or shows flaws upon testing, it may be discarded; in which case the purchaser and the manufacturer may agree upon the selection of another specimen in its stead.

Inspection may be made at the manufacturer's works where the castings are made, or at the point at which they are received, at the option of the purchaser.

If the purchaser elects to have the inspection made at the manufacturer's works, the manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge, to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

### Rejection

Castings that fail to conform to these specifications or that show injurious defects revealed by machining operations subsequent to acceptance may be rejected and, if rejected, the manufacturer's responsibility shall be limited to replacing the rejected material without charge to the purchaser. The full weight of the original material rejected shall be returned to the manufacturer.




*NOTE:*

*The Gage Length, Parallel Section and Fillets shall be as shown, but the Ends may be of any Shape to fit the Holders of the Testing Machine in such a way, that the Load shall be Axial.*

*In Order to promote the Breaking of the Specimen in the Center it is permissible to use a Taper in the Reduced Section from the Fillets to the Center of not to exceed 0.010 in.*

*It is recommended, that Diameter d, be from 3/4 to 1."*

Fig. 1

**To Guard Against the 7th Column—**

A.F.A. Code of Recommended

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High pressure war production work demands constant vigilance against the "7th Column"—Carelessness. Adopt this important Code to your own plant. Developed by A.F.A. Industrial Hygiene Codes Committee and approved as recommended practices for the Foundry Industry. Code covers engineering and good housekeeping requirements, also specifications for personal protection in all branches of the castings industry. Recommendations involve prime movers, the pattern, machine and maintenance departments as well as direct foundry operations. Fifth of the A.F.A. Recommended Good Safety Practice Codes, indispensable to the safe and efficient operation of the modern foundry.

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# Sustaining Members of the Association To Receive Special Membership Emblem

YOUR Association has developed a new and striking membership emblem for its Sustaining Members which they will be proud to display. The emblem is designed as a recognition to those members of the Association who are paying, in addition to the annual company membership dues, as much as $100 additional to further the aims and objects of the Association.

The new emblem, approximately 10-in. square, shows in gray, the insignia on the front of the A.F.A. gold medals, awarded annually for outstanding contributions to the advancement of the industry, on a black background and enclosed in a silver border. As shown in the accompanying illustration, the words "American Foundrymen's Association" appear at the top of the insignia and "Sustaining Member" at the bottom.

In line with the materials conservation program of the War Effort, the new emblems do not involve the use of any strategic materials.

As Sustaining Members of your Association, the following have received, or shortly will receive, the new emblems:


### SUSTAINING MEMBERS

(As of Nov. 16, 1942)

Ajax Metal Co., Philadelphia, Pa.
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Allis Chalmers Manufacturing Co., Milwaukee, Wis.
Aluminum Industries, Inc., Cincinnati, Ohio.
American Air Filter Co., Louisville, Kentucky.
American Cast Iron Pipe Co., Birmingham, Ala.
American Foundry Equipment Co., Mishawaka, Ind.
American Laundry Machinery Co., Cleveland, Ohio.
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Canadian Bronze Co., Ltd., Montreal, Quebec, Canada.
Capital Foundry Co., Long Island City, New York.
Carondelet Foundry Co., St. Louis, Missouri.
Caterpillar Tractor Co., Peoria, Ill.
Chain Belt Co., Milwaukee, Wis.
Chevrolet Gray Iron Foundry, Saginaw, Mich.
Chicago Steel Foundry Co., Chicago, Illinois.
Chrysler Corporation, Detroit, Mich.
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Climax Molybdenum Co., New York, New York.
Continental Roll & Steel Foundry Co., East Chicago, Ind.
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Crane Ltd., Montreal, Quebec, Canada.
Deere & Company, Moline, Ill.
Detroit Gray Iron Foundry Co., Detroit, Mich.
Detroit Steel Castings Co., Detroit.
Eclipse Aviation, Bendix, N. J.
Electro Steel Castings Co., Indianapolis, Ind.
Electric Steel Foundry Co., Portland, Ore.
Elmira Foundry Co., Inc., Elmira, New York.
Falcon Bronze Co., Youngstown, Ohio.
Falk Corporation, Milwaukee, Wis.
Federated Metals Div., American Smelting & Refining Co., St. Louis, Missouri.
Florence Pipe Foundry & Machine Co., Florence, N. J.
Foran Foundry & Manufacturing Co., Flemington, N. J.
Foundry Equipment Co., Cleveland, Ohio.
Frank Foundries Corporation, Moline, Ill.
Fulton Foundry & Machine Co., Cleveland, Ohio.
General Electric Co., Lynn Works, West Lynn, Mass.
General Malleable Corporation, Waukesha, Wis.
Gibson & Kirk Company, Baltimore, Maryland.
Grede Foundries, Inc., Liberty Foundry Div., Wauwatosa, Wis.
Griffin Wheel Co.. Chicago, Ill.
Gunite Foundries Corp., Rockford, Illinois.
Oscar W. Hedstrom Corporation, Chicago, Ill.
Herman Pneumatic Machine Co., Pittsburgh, Pa.
Hill & Griffith Co., Cincinnati, Ohio.
Hoosier Iron Works, Kokomo, Ind.
Hunt-Spiller Manufacturing Co., Boston, Mass.
Hydro-Blast Corporation, Chicago.

Illinois Clay Products Co., Joliet, Ill.
International Harvester Co., Chicago, Illinois.
International Nickel Co., New York, New York.
Chas. C. Kawin Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
Lynchburg Foundry Co., Lynchburg, Virginia.
Milwaukee Foundry Equipment Co., Milwaukee, Wis.
Milwaukee Malleable & Gray Iron Works, Milwaukee, Wis.
Robert Mitchell Co. Ltd., Montreal, Quebec, Canada.
Motor Castings Co., West Allis, Wis.
National Engineering Co., Chicago.
Nordberg Manufacturing Co., Milwaukee, Wis.
S. Obermayer Co., Chicago, Ill.
Ohio Brass Co., Mansfield, Ohio.
Osborn Manufacturing Co., Cleveland, Ohio.
Overmyer Mould Co., Winchester, Indiana.
Pangborn Corporation, Hagerstown, Maryland.
Peerless Mineral Products Co., Conneaut, Ohio.
Penton Publishing Co., Cleveland, Ohio.
Perfect Circle Co., Newcastle, Ind.
Geo. F. Pettinos, Philadelphia, Pa.
Pickands Mather & Co., Cleveland, Ohio.
Plainville Casting Co., Plainville, Connecticut.
Pontiac Motor Div., General Motors Corp., Pontiac, Mich.
Quality Aluminum Casting Co., Waukesha, Wis.
Royer Foundry & Machine Co., Burlington, N. J.
Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.
Claude B. Schneible Co., Chicago, Ill.
Sivyer Steel Casting Co., Milwaukee, Wis.
W. W. Sly Manufacturing Co., Cleveland, Ohio.
Werner G. Smith Co., Cleveland, Ohio.
Snyder Foundry Supply Co., Los Angeles, Calif.
Standard Foundry Co., Racine, Wis.
Stockham Pipe Fittings Co., Birmingham, Ala.
Tabor Manufacturing Co., Philadelphia, Pa.
Unit Cast Corporation, Toledo, Ohio.
U. S. Pipe & Foundry Co., Burlington, N. J.
Universal Foundry Co., Oshkosh, Wisconsin.
Vanadium Corporation of America, New York, N. Y.
Vermont Foundries, Inc., Springfield, Vermont.
Waukesha Foundry Co., Waukesha, Wisconsin.
West Michigan Steel Foundry Co., Muskegon, Mich.
Whitehead Bros. Co., New York, New York.
Whiting Corporation, Harvey, Ill.
Wisconsin Steel Company, Chicago, Illinois.
Woodruff & Edwards Co., Elgin, Ill.
Woodward Iron Co., Woodward, Alabama.
Youngstown Foundry & Machine Co., Youngstown, Ohio.

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## New Committee Members

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G. E. Clark, Cummins Engine Co., Columbus, Ind.

J. J. Curran, Research Metallurgist, Walworth Co., Greensburg, Pa.

*Committee on Microstructure of Cast Iron:*

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W. H. Spencer, Chief Molybdenum Section, Tungsten Branch, W.P.B., Washington, D. C.

STEEL DIVISION

*Round Table Conference Committee:*

T. D. West, Chairman, c/o Deere & Co., Moline, Ill.

A.F.A. REPRESENTATIVES

*Representatives on Joint Committee on Glossary of Heat Treating Terms (SAE-ASTM-AFA-ASM):*

H. Bornstein, Director, Testing and Research Laboratories, Deere & Co., Moline, Ill.

J. S. Vanick, Metallurgist, International Nickel Co., New York, N. Y.

A new fine-grain industrial film for use in radiography has been announced E. I. DuPont de Nemours & Co., Wilmington, Del., for radiographing lighter metals with sharper detail and shorter exposures. The film is said to have twice the speed of the usual fine-grain film used in industrial radiography, making possible the use of lower voltages and with less wear on equipment.

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**Get behind the voluntary War bond purchase program — *"A Dime for Every Dollar Every Pay Day."***

# Orders of the Day--and Tomorrow

## Changes Authority to Make War Contracts

IMPORTANT changes in the law relating to the authority of the War and Navy Departments and the U. S. Maritime Commission to negotiate war contracts are contained in the new Revenue Act of 1942.

Some of the new amendments represent a codification of practices which the Price Adjustment Boards of the three services have been following in recent months. Others are of a basic nature and are intended to clarify practices and speed negotiation. Copies of the Act and changes may be obtained from the Government printing office.

## Repairs, Maintenance Given Top Priority

TOP priority rating of AA-1 may be applied to essential repair and maintenance for productive facilities, utilities, housing and consumers' durable goods, according to authorization released November 11 by the Requirements Committee, W.P.B. By this action vital plants and factories, mines and refineries, and other industrial facilities will be able to continue effective production of war materials and essential civilian goods.

Until the Controlled Materials Plan goes into full operation, existing priorities system will be used to obtain the steel, copper and aluminum needed for such maintenance and repair. Under the new plan, each agency will break down its material requirements into that needed for production, for construction, and for maintenance and repair.

## Many Foreign Patents Available to Industry

DRAWINGS and specifications of foreign-owned patent applications seized by the Alien Property Custodian will be printed and made available to American industry at a nominal price, according to the Office of War Information. These applications ordinarily cover latest developments in patentable fields and many can improve American processes and devices. Publication of the printed copies of patent applications will begin in December.

Any registered patent attorney may obtain permission to inspect and make copies of the file of a vested application (other than an application which stands under secrecy order) upon filing with the Patent Prosecution Section, Office of the Alien Property Custodian, Washington.

## Reaffirm Ceiling for Single Scrap Sellers

INDIVIDUAL sellers of waste, scrap and salvage materials are eliminated from the scope of O.P.A. Procedural Regulation No. 6 and Supplementary Order No. 9, in an O.P.A. action dated November 11, providing a speedy method for adjustment of established maximum prices.

The November 11 ruling excludes the following revised price schedules of interest to foundrymen: No. 2, Aluminum Scrap and Secondary Aluminum Ingot; No. 3, Zinc Scrap Materials and Secondary Slab Zinc; No. 4, Iron and Steel Scrap; No. 8, Nickel Scrap and Secondary Materials; No. 12, Brass Mill Scrap; No. 20, Copper Scrap; No. 70, Lead Scrap Materials.

## Higher Priority for Laboratory Supplies

UNDER an order dated November 5, Preference Rating Order P-43 continues in effect and has been revised to give higher priority for purchases of laboratory supplies, and to include laboratories for production control as well as for research work. Such laboratories, if formerly operating under P-43, now may apply a AA-2X rating to purchases, and if not previously under P-43 may apply on Form PD-107 for right to use the AA-2X rating.

In addition, order P-43 no longer covers purchases of items costing over $50. To purchase such items specific permission to use the P-43 rating must be obtained, application being made on Form PD-620.

## Government "Shorts"

*(More detailed information on any of the following news briefs may be obtained from the U. S. Information Center, Washington, D. C.*

*Brass Scrap Buyers' Pricing* (O.P.A.)—Buyers of specially prepared brass mill scrap (other than brass mills, ingot makers and copper refineries) are given new simplified procedure for determining prices to pay. Amend. 4 to Rev. Price Sched. 12, eff. Nov. 19.

*Second-Hand Machine Certificates* (O.P.A.)—2,000 certificates of registration have been mailed to persons selling 2d-hand machine tools, machines or parts under O.P.A. requirement that all dealers must register on OPA Form SO 20:3.

*U. S. Held Shellac* (Def. Spls. Corp.)—Defense Supplies Corporation will purchase stocks of shellac held in U. S., offers to be received by March 1, by Associated Representatives, 155 John St., New York.

*"Trade Name" Brass Ingots* (O.P.A.)—Maximum prices for special "trade name" brass and bronze alloy ingots produced by persons other than those considered in the trade as ingot makers are announced in Amend. 1 to M.P.R. 202, eff. to Aug. 19.

Certain industrial plants with 100 employees or more will be required to set up organized transportation plans under nationwide mileage rationing to assure workers adequate means of getting to and from jobs under rationing restrictions, according to an October 28 announcement by O.P.A. in the national rubber conservation program.

# Plastic Coatings for Core Boxes

By Geo. K. Dreher,* Milwaukee, Wis.

**Due to war conditions, materials for core box manufacture have been somewhat restricted. The accompanying article gives the results of an investigation made on a suggested coating for wood core boxes intended to increase their life. While performance data are somewhat limited, the material seems to offer possibilities for broader application.**

THE aim of the patternmaker and production man for many years past has been to achieve a coating on wood patterns which could approximate the finish and texture of polished metal equipment. Approaches to this ideal have been accomplished through the use of fortifiers in shellac, lacquer base coatings, and the use of some paints.

The need for this type of coating on wood patterns has been further stressed by the shortage of aluminum and magnesium during the present war program, as well as by the usual high expense of metal equipment. The closest realization of this ideal has been achieved by a process which can be termed "plastic veneering."

## MATERIALS TO BE USED

The plastic veneering component in its liquid state is water-clear and can be colored with the many hues of the rainbow through the use of various pigments. Patterns to be treated with this process should preferably be free and clear of varnish, shellac or any other paint material, and must have no wax fillets or other greasy substances which might form a parting between the wood and the plastic.

Naturally, such porous materials as leather, plastic wood, water putty and plaster can be used as a fillet and patching material instead. The wood should be as smooth as possible with all cracks and open graining treated with a filler or plastic wood.

A bond is first applied to this bare wood pattern, after which the plastic is applied by spraying. The viscose plastic material is then sprayed on in successive coats of 0.003 inch each. At present each successive spraying is followed by treatment in a special solvent extraction chamber. The removal of this solvent permits the blending of the successive coats into one continuous film.

### Pine and Fir Are Best

Ordinary pine and fir patterns take the plastic application most successfully. Mahogany and oak would require some filler. The thickness of this film can be built up from 0.002 inch to over 0.025 inch. Hardness can be controlled by varying the components.

For average conditions, a thickness of 0.010 inch should be applied. Obviously, allowance will have to be made for this coating in the pattern itself, and similarly, undersized patterns can be built up by heavier applications of the material.

### Physical Properties

Surfaces up to 91 per cent of the hardness of glass can be procured. The most practical hardness has not as yet been determined for pattern service. Tensile strength of the material is about 15,000 lbs. per square inch. The elastic properties permit expansion and contraction with the normal reaction of the wood.

When metal patterns are to be coated, the first or bonding coat must be thoroughly baked.

Other physical characteristics of this material indicate that its use as a pattern coating is natural. It has a melting point of 235 to 255° C (455 to 491° F.), with very poor heat conductivity.

The material will break down chemically under high heats, although it will not burn by itself. It is unaffected by weak or fatty acids, mineral and vegetable oils or gasoline. In addition, it is highly resistant to alcohol. It is, however, soluble in ketones, chlorinated hydrocarbons, ketone esters, and glycols.

## SERVICE CHARACTERISTICS

This plastic veneering has been applied to patterns of various sizes, including several core boxes. On patterns we have observed that parting compound is needed only at the beginning of the run. The use of hot sand on the surface of the pattern has no apparent effect, thereby permitting continuous all-out production within a confined molding area. Finish on the castings, as can be expected from observance of the plastic surfaces, is equal to and possibly surpasses that of metal patterns.

Observance of the several specimens which we have here shows that the application of a sand blast nozzle at 80 lbs. per sq. in. pressure with the nozzle moving back and forth, showed no break through after fifteen seconds under this treatment. When the nozzle is held stationary, blistering occurs due to localized heat on the plastic.

### Results of Tests

These tests indicate that an extremely long production life can be expected without maintenance cost on the pattern. This is of particular importance under present conditions. Time has not permitted runs beyond 350 molds, so accurate service life cannot be reported at this time.

The coating performs even better in core boxes where its resistance to core compounds makes it extremely desirable. The presence of many solvents and drying agents, usually found in most modern core binders, usually results in rapid deterioration of core box surfaces. The resistance of this plastic surface to these various oils and solvents has been mentioned previously.

The sand blast test indicates also that the use of this coating for core blower jobs may be the answer to the rapid creation of wood core boxes for long run rush jobs.

## COST OF PROCESS

At the moment, the experimental method of applying the

*Plant Manager, Ampco Metal, Inc.

surfacing runs to about $5.00 per square foot, thereby making the total wood pattern plus coating cost somewhere in the neighborhood of one-half to two-thirds that of a metal plate. Expanding usage of the material will ultimately result in cheaper methods of application.

Under present conditions of long delivery on all metal equipment, we believe that even this relatively high cost is justified. This will be especially true on intricate and thin web sections where wood patterns usually break down under the strain of high production demands. When we consider the lack of servicing necessary on the patterns, the high initial cost can be readily amortized.

POSSIBILITIES

The future of this material depends upon its wider application and the gathering of performance data beyond that which has been reported above. Its characteristics definitely place it in a desirable niche between low cost wood patterns and high cost metal equipment, and as such, should find an expanding usage among the nation's foundries.

## Book Review

*Metallurgy*, by Carl G. Johnson, 1942 edition, 5½ x 8½, cloth cover, 262 pages, 130 illustrations, published by American Technical Society, Chicago, Ill. Price, $2.50.

This text is designed for those working in the metal industries who seek some general knowledge of why metals behave as they do. It may be used as a textbook for trade and technical schools where only short and elementary courses in metallurgy are available.

This book was originally published in 1938 with reprintings in 1940 and 1941. The present 1942 edition is a revision of the previous edition and has been enlarged to include sections on bearing alloys, aluminum alloys, copper and copper alloys, alloy steels, cast iron and heat treatments.

This book gives a hasty glance at the field of metallurgy, although sufficient for the purpose intended. It covers such subjects as the tests for metal properties, ore dressing and refining, production of iron and steel, physical metallurgy, shaping and forming of metals, commercially important non-ferrous metals, light metals and alloys, copper and its alloys, steel, heat treatments for steel, surface treatments, alloy steels, classification of steels, and powder metallurgy. The last section on literature of metallurgy is one that provides the beginner with references where more detailed discussions may be obtained.

# Random Comments

### CENTRIFUGAL CASTING

INTEREST in the centrifugal casting process of metals is increasing to the boiling point. More and more interest is being shown in the process. Heretofore this process has been devoted to shapes of rather simple design and mostly of a circular nature. However, with increased interest, we can look forward to further development to the point where it may be possible to cast rather complicated designs by this process.

This cannot be done overnight, but research, if properly conducted, can do much to increase this field of casting. It has many potentialities, but up to the present its development has been hamstrung by secrecy. While many companies make castings centrifugally, each individual shop has developed its own equipment and theories. Some shops are making fairly large circular type castings by the centrifugal process. The only reason they have not developed the casting of larger designs is because of limitation of the size of equipment due to the centrifugal force developed.

The field of centrifugal castings opens up a possibility for the wider adoption of castings and elimination of some of the defects which seem to be inherent in the sand casting process. By that statement we do not mean to say that the field for the sand process is limited. Castings will always be made in sand. However, the possibility of producing castings to resist particular types of stress by this process is worth looking into. This is evidenced by the fact that one company has developed a centrifugal casting process for gears and has definitely proved to its own satisfaction that the resistance to stress at the base of the teeth of a gear made by the centrifugal process is superior to resistance in gears made by the forging process.

An exchange of information on production, practices, theory and design among present manufacturers of centrifugal castings should serve a good purpose in developing the use of this process to a greater extent than it is now in use in the industry.

### ALL 10 PER CENTERS!

THE Treasury Department of your Government has launched a nation-wide drive for all American industry to secure 100 per cent cooperation in the 10 per cent payroll deduction program for War Bonds.

The Foundry Industry has not been laggard nor have the foundrymen of the nation been reticent about offering both their money and their services to help win the war. Many foundries throughout the country have been presented with Minute Man flags to show that practically all their employees are buying 10 per cent or more of each dollar earned for war bonds. However, some have not reached the goal and have not been presented with the Minute Man flag.

The difference between all employees subscribing 10 per cent of their earnings to war bonds and the present percentage of employees not so cooperating is small. It would not take much work to go over the top. The foundry industry, which is gaining recognition daily for its outstanding contributions to the war effort, can put another star in its service flag by being the first industry to have 100 per cent of its employees as 10 per centers. This goal is not too far distant.

Let's really put on the pressure to reach it and be "No. 1" among the industries in putting over the new War Bond drive.

# New Members

**In this month's total of new members (a total of 104) 21 of the 24 A.F.A. chapters are represented . . . a splendid showing. Only Ontario, Central New York and the University of Minnesota Student Chapter did not report new members admitted. The Chicago Chapter and the Wisconsin Chapter lead the parade this month, Chicago with 15 and Wisconsin with 18. Thus Fall membership activities begin to bear real fruit.**

**(October 16 to November 15, 1942)**

*Conversions:*

*Company from Personal—*

***Caldwell Foundry & Machine Co., Birmingham, Ala. (C. P. Caldwell, Pres.)**

### Birmingham District Chapter

L. E. Greer, Jr., Director of Priorities, Thomas Foundries, Inc., Birmingham

Harvey L. Julian, American Cast Iron Pipe Co., Birmingham

F. H. Livingston, McWane Cast Iron Pipe Co., Birmingham

H. S. Mize, Cupola Foreman, Goslin-Birmingham Co., Birmingham

W. B. Somers, Goslin-Birmingham Co., Birmingham

Ben Tyus, Fdry. Foreman, Caldwell Foundry & Machine Co., Birmingham

### Central Indiana Chapter

John N. Segerson, Salesman, Republic Steel Corp., Indianapolis

### Chesapeake Chapter

Richard J. Haynes, Washington, D. C.

Erle J. Hubbard, Asst. Met., Koppers Co., American Hammered Piston Ring Div., Baltimore, Md.

Charles M. Krautler, Molder, U. S. Naval Gun Factory, Washington, D. C.

### Chicago Chapter

George Baker, Gen'l Foreman C.F.&A., American Steel Foundries, East Chicago, Ind.

John J. Bruno, Foreman, American Manganese Steel Co., Chicago Heights, Ill.

H. A. Buchanan, Chrysler Corp., Dodge Chicago Plant, Chicago

Maynard Clapham, Ass't Patt. Shop Foreman, American Manganese Steel Co., Chicago Heights, Ill.

***Delta Star Electric Co., Chicago (H. A. Tracy, Ass't Sec'y-Treas.)**

Wm. A. Hansen, Patt. Shop Foreman, Continental Roll & Steel Foundry, East Chicago

***Industrial Pattern Works, Chicago (Harry J. Jacobson, Owner.)**

Alfred Kich, Patt. Shop Foreman, American Manganese Steel Co., Chicago Heights

John J. Magyar, Foreman Core Room, Calumet Steel Casting Corp., Hammond, Ind.

Vincent W. Moeglin, Jr., Core Foreman, American Steel Foundries, East Chicago

Eugene F. Petersen, Sand Control Foreman, American Steel Foundries, East Chicago

V. Plesscher, Research Director, The National Research Bureau, Inc., Chicago.

Eugene Shultz, Coremaker, Hansell-Elcock Co., Chicago

Roger F. Sherman, Fdry. Engr., Hydro-Blast Corp., Chicago

Carl Wilms, W. D. Allen Manufacturing Co., Chicago

### Cincinnati District Chapter

Guilford Bohn, Fdry. & Mach. Shop Contact Man, Cincinnati Milling Machine Co., Cincinnati

William Foote, Fdry. Foreman, Buckeye Iron & Brass Works, Dayton, Ohio

I. M. Johnsen, Supt., Griffin Wheel Co., St. Bernard, Ohio

W. G. Thompson, Supv., Cincinnati Milling Machine Co., Cincinnati

### Detroit Chapter

Walter F. Blyler, Junior Met., Kelsey Hayes Wheel Co., Detroit

***Commerce Pattern Foundry & Machine Co., Detroit (E. J. Rousseau, Pres.)**

James Norman Giles, Fdry. Supt., Central Specialty Co., Detroit

### Eastern Canada and Newfoundland Chapter

Lucien Beaudry, Gen'l Foreman Rad. Div., Warden King, Limited, Montreal, Que., Canada

R. J. G. Boyd, Sales & Service, Robert Mitchell Co., Ltd., Montreal

Wm. C. H. Dunn, Partner, Western Pattern Works, Montreal

W. M. Hamilton, Factory Mgr., Warden King, Ltd., Montreal

Henry Julian Kozlowski, Metallurgical Chemist, Crane Limited, Montreal

William Nuttall, Foundry Foreman, Warden King, Ltd., Montreal

***Western Pattern Works, Montreal (Wm. Seeds, Partner.)**

### Metropolitan Chapter

H. B. Caldwell, District Mgr., Whiting Corporation, New York

Frank B. Eliason, Pennsylvania Foundry Supply & Sand Co., Philadelphia

Robert H. Gilbert, Met., General Bronze Corp., Long Island, N. Y.

Irving M. Martin, Jr., Supt., American Steel Castings Co., Newark, N. J.

Ben Waxler, Teacher, Board of Education, New York

### Michiana Chapter

Roy E. Bernius, Met., Michiana Products Corp., Michigan City, Ind.

Clare W. Dock, Pres. & Mgr., Dock Foundry Co., Three Rivers, Mich.

Don Goddard, Michiana Products Corp., Michigan City

### Northeastern Ohio Chapter

Carl A. Harmon, Plant Supt., Ideal Foundry Div., Republic Steel Corp., Newton Falls

Edward R. Stutz, Timestudy Supv., National Malleable & Steel Castings Co., Cleveland

Lewis A. Way, Jr., President, Columbiana Foundry Co., Columbiana

Fred Wilson, Instructor, Cleveland Cooperative Stove Co., Cleveland

### Northern California Chapter

Chas. E. Palmer, Coremaker, Enterprise Engine & Foundry Co., San Francisco

Charles Quesnoy, Partner, Acme Pattern Works, Berkeley

### Northern Illinois-Southern Wisconsin Chapter

L. C. Fill, Foreman, Geo. D. Roper Corp., Rockford, Ill.

Lyle Fulton, Foreman, Patt. Shop, Geo. D. Roper, Corp., Rockford

### Philadelphia Chapter

Sheldon W. Hughes, Fdry. Supt., Hale Five Pump Co., Conshohocken, Pa.

### Quad City Chapter

B. O. Collins, Met., A. H. Putnam Co., Rock Island, Ill.

***Ordnance Steel Foundry Co., Bettendorf, Iowa (Geo. D. Branston, Vice-Pres.)**

### St. Louis District Chapter

Arthur LeClaire, Clerk, Fulton Iron Works Co., Inc., St. Louis

Gordon McMillin, Met., General Steel Castings Corp., Armor Plant, Madison, Ill.

*Company Members.

### Southern California Chapter

A. K. Cole, A. K. Cole Foundry, Los Angeles
Paul K. Jones, Sales Engr., U. S. Electrical Motors, Inc., Los Angeles
W. G. McLean, Sec'y-Treas., Snyder Foundry Supply Co., Los Angeles
Harold Svenson, Mechanical Foundries, Inc., Los Angeles

### Toledo Chapter

Earl Kosbab, Inspector, Unitcast Corporation, Plant No. 1, Toledo, Ohio
Louis Marazon, Inspector, Unitcast Corporation, Plant No. 1, Toledo
John A. Mescher, Unitcast Corporation, Toledo

### Twin City Chapter

Robert Melvin Scanlon, Student, University of Minnesota, Minneapolis, Minn.

### Western Michigan Chapter

Roger W. Hathaway, Fdry. Supt., Federal Mogul Company, Detroit, Mich.

### Western New York Chapter

Albert R. Amann, Patt. Foreman, Acme Steel & Malleable Iron Works, Buffalo, N. Y.
Charles L. Epperson, Asst. Supt. Plant "C," Symington-Gould, Inc., Rochester, N. Y.
Lyman S. Harwood, Lab. Tech., Harrison Radiator Div. of General Motors, Lockport
H. J. Livingston, District Mgr., Precision Grinding Wheel Co., Buffalo
Edgar J. Sierk, Foundry Methods, Harrison Radiator Div. of General Motors, Lockport
William H. Taylor, Core Room Supt., Worthington Pump & Machinery Corp., Buffalo
A. F. Wolf, Simonds Saw & Steel Co., Lockport

### Wisconsin Chapter

Edwin S. Armstrong, Asst. to Pres., General Foundries Co., Milwaukee
David W. Benbow, Supt., Smith Steel Foundry Co., Milwaukee
Chas. Bergman, Sr., Fdry. Foreman, Smith Steel Foundry Co., Milwaukee
Russell C. Bumbalek, Proc. Engr., Ampco Metal Inc., Milwaukee
Robert J. Cox, Chemist, Ampco Metal, Inc., Milwaukee
C. L. Dreyfus, Supv., Ampco Metal, Inc., Milwaukee
Ray F. Huber, Ampco Metal, Inc., Milwaukee
Geo. W. Johnson, Melter, Bucyrus-Erie Co., So. Milwaukee
Roland P. Klumb, Fdry. Tech., Delta Oil Products Co., Milwaukee
Russel Krewson, Prod. Mgr., Smith Steel Foundry Co., Milwaukee
Ed. Leckington, Foreman, Lawran Foundry, West Allis
Harold W. Luebke, Sub-Contr. Div., Ampco Metal, Inc., Milwaukee
Andrew Majcoch, Fdry. Foreman, A. J. Lindeman & Hoverson, Milwaukee
John A. McCormick, Supt., Ind. Relations, Ampco Metal, Inc., Milwaukee
Julius F. Mueller, Supt., Wisconsin Grey Iron Foundry, Milwaukee
Jacob Schneider, Proprietor, Jacob Schneider Pattern Works, Milwaukee
Alvin Worden, Allis-Chalmers Mfg. Co., Milwaukee
William C. Zunker, Foreman, Allis-Chalmers Mfg. Co., Milwaukee

### Outside of Chapter

W. M. Bering, Jr., Vice-Pres., Chambers, Bering, Quinlan Co., Decatur, Ill.
Edward G. Born, Asst. Fdry. Planning Engr., Fort Pitt Steel Casting Co., McKeesport, Pa.
Morley B. Ellwood, Fdry. Planning Engr., Fort Pitt Steel Casting Co., McKeesport, Pa.
***General Fire Extinguisher Co., Providence, R. I. (William Kay, Gen'l Plant Mgr.)**
***Edgar Thomson Works, Carnegie-Illinois Steel Corp., Braddock, Pa. (Edwin A. Graham, Supt.)**
Morris C. Helander, Fdry. Foreman, Enardo Foundry & Mfg. Co., Tulsa, Okla.
Ernest C. Kron, Research Engr., Battelle Memorial Institute, Columbus, Ohio
Clyde Oliver, Patt. Shop Foreman, Fort Pitt Steel Casting Co., McKeesport, Pa.
E. J. Pike, Information Officer, High Duty Alloys, Ltd., Trading Estate, Slough, Bucks, England
James W. Silver, President, Ogden Iron Works Co., Ogden, Utah

## More Awards Given for Production Merit

CERTIFICATES of Individual Production Merit have been awarded by W.P.B. to 22 more workers in war plants, the second group so honored, for suggestions that have actually increased quantity or quality of war production. In addition to the certificate winners, 29 other workers received honorable mention for similar suggestions.

Winning suggestions, chosen by the Board of Individual Awards from among hundreds of suggestions submitted by employees in 1,600 war plants, range from simple to highly technical operations, covering many processes. A total of 24 separate plants are represented in the latest award groups.

As an example of the ideas recognized was the suggestion that an acid bath be used for reclaiming worn-out files. This increased the life of a file from 200 to 300 per cent and also made available for other uses good files, which are becoming increasingly difficult to obtain.

It so happens that none of the awards made were directly concerned specifically with any foundry process, although undoubtedly hundreds of suggestions have been submitted by foundry plant employees. All winning suggestions are made available for use in plants throughout the country, and should contribute to increased production of war materials.

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An article by J. S. Fullerton in the August 14 issue of "The Metal Industry" reports tests on the alloying effect of silver in non-ferrous alloy castings. The data on these tests show potent alloying effect, similar to benefits obtained by the addition of nickel to carbon steels. The research work has been on alloys including cupro-nickel, brass, bronze, aluminum bronze, beryllium bronze, silicon bronze, etc.

## WANTED!

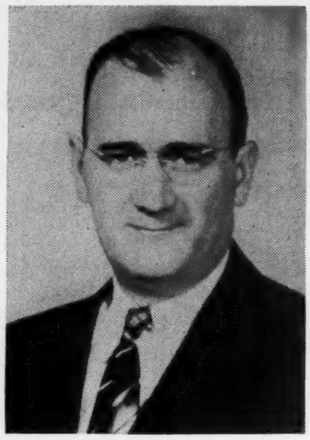
The American Foundrymen's Association would be interested in learning of a man with a science degree, who is not subject to draft, or a woman with a science degree, to accept a fellowship at Cornell University, Ithaca, N. Y., to assist in the investigation of the effect of high temperatures on the properties of foundry sands. The fellowship should be particularly interesting to persons wishing to secure advanced degrees as this is possible in connection with the work at the university.

Anyone interested or knowing anyone who might be interested is requested to submit his or her name to the Assistant Secretary, American Foundrymen's Association, 222 W. Adams St., Chicago, Illinois.

# CHAPTER OFFICERS

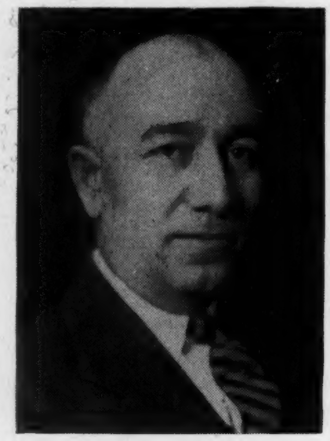
**A. S. Klopf**
Hansell-Elcock Co.,
Chicago
**Director**
**Chicago Chapter**

**J. C. Gore**
Werner G. Smith Co.,
Chicago, Ill.
**Director**
**Chicago Chapter**



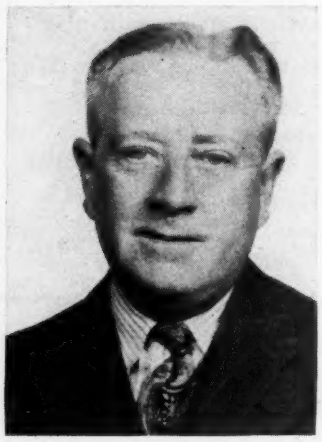
**R. R. Haley**
Advance Aluminum & Brass Co.,
Los Angeles, Calif.
**Director**
**Southern California Chapter**

**K. V. Wheeler**
American Steel Castings Co.,
Newark, N. J.
**Vice-Chairman**
**Metropolitan Chapter**



**W. O. Moyer**
Otis Elevator Co.,
Yonkers, N. Y.
**Director**
**Metropolitan Chapter**

**Roy A. Clark**
Toledo Machine & Tool Div.,
E. W. Bliss Co., Toledo, Ohio
**Vice-Chairman**
**Toledo Chapter**



**E. N. Delahunt**
Warden King, Ltd.,
Montreal, Quebec
**Director**
**Eastern Canada and Newfoundland Chapter**

**T. J. Magnuson**
J. S. McCormick Co.,
Chicago, Ill.
**Director**
**Chicago Chapter**

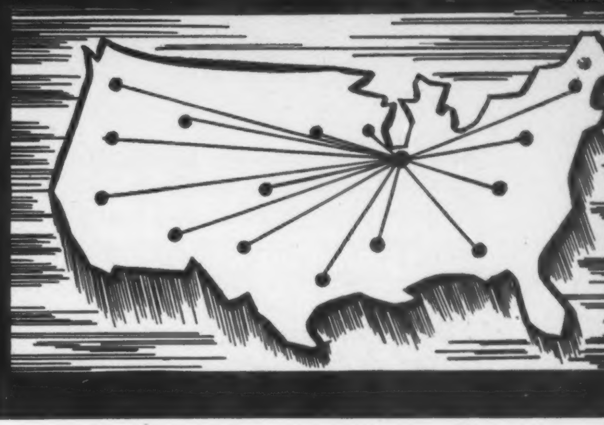
**Wm. D. Dunn**
Frazer & Jones Co.,
Syracuse, N. Y.
**Director**
**Central New York Chapter**

**F. E. Hutchinson**
Reliance Foundry Co.,
Cincinnati, Ohio
**Chairman**
**Cincinnati Chapter**

**H. J. Noble**
American Cast Iron Pipe Co.,
Birmingham, Ala.
**Director**
**Birmingham Chapter**

**Robert Bernard**
La Cie J. A. Gosselin, Ltd.,
Drummondville, Quebec
**Director**
**Eastern Canada and Newfoundland Chapter**

# Chapter Activities



## New England Discusses Use of the Ferro-Alloys in Gray Iron

By M. A. Hosmer,* Boston, Mass.

WITH 86 members and guests present, the New England Foundrymen's Association met November 11 at the Engineers Club, Boston, for its regular monthly meeting, and particularly to hear an interesting paper on the "Role of Ferro-Alloys in Meeting War Emergency Conditions in Gray Iron Foundries." The paper was presented by John A. Ludwig, Jr., Electro Metallurgical Sales Corp., New York, who was introduced by Chapter President Raymon F. Meador, Whitin Machine Works, Whitinsville, Mass.

Mr. Ludwig laid stress on metallurgical control, with frequent standardized tests throughout each melt. Chill tests, machining tests, physical and chemical determinations, he said, are as much a part of good foundry procedure as are mixture calculations and proper foundry practice. Present restrictions of critical materials demand closer control of cupola operations, more frequent chemical analyses of melt, and periodic sulphur determinations on coke.

The evening's coffee talk was given by Hans J. Theiler, Whitin Machine Works, Whitinsville, and a native of Switzerland, on "Switzerland in the War."

### October 14 Meeting

At the October meeting, with 90 members present at the Engineers Club, Boston, guest speaker was Chas. A. McCarthy, superintendent of production at Watertown Arsenal, Watertown, Mass., on the subject "Castings for Ordnance Material." The principal requirements for ordnance castings, Mr. McCarthy stated, are precision accuracy, and soundness. He stated that the magnaflux method of inspecting steel castings is a standard test at Watertown and of great help in eliminating hot tears, cracks and chills, and keeping defective castings at a minimum. He also illustrated, with slides, how poor welding of steel castings shows up under magnaflux testing, emphasizing the importance of stress relieving after welding.

The speaker spoke of the many steps for saving castings, time and money at the Arsenal, for example, all chips from machining operations being saved for the various classes of alloyed steels, then being separated, briquetted and returned to proper melts. The use of X-ray and pilot castings also were approved as methods of testing castings for ordnance work, and Mr. McCarthy congratulated foundrymen on their ability to produce castings with physical characteristics thought impossible a few years ago.

*Hunt-Spiller Mfg. Corp., and Reporter, New England Foundrymen's Association.

## Wisconsin Has War Conference Program

IN COOPERATION with the Wisconsin State Chamber of Commerce, the Wisconsin Chapter of A.F.A. jointly sponsored a War Conference Program on November 20, at the Hotel Schroeder, Milwaukee. With the purpose of discussing problems of the state's commerce, industry and agriculture as affected by the

*(Photos courtesy A. H. Allen, Penton Publishing Co.)*

How a few members and guests of the Detroit Chapter enjoyed themselves at the annual chapter outing and picnic. Top Row (left)—Bob Crawford, Atlas Foundry Co., Detroit, at "mike," assisted by Fred J. Walls, International Nickel Co., Detroit, announces prize winners. (Center)—Foundry delegation of the Budd Wheel Co. (Right)—Geo. A. Fuller, Federal Foundry Supply Co., Detroit, compares scores with W. G. Mixer, Buick Motor Div. Bottom Row (left)—A few of the 215 who enjoyed the buffet dinner. Right (left to right)—E. A. Barch, Pontiac Motor Div., Pontiac, Mich.; A.F.A. National Secretary R. E. Kennedy, Chicago; Vaughan Reid, City Pattern Works, Detroit, and National A.F.A. Director; W. G. Mixer.

war, a number of prominent speakers were featured on the program, which included morning, luncheon and afternoon sessions, climaxed by a banquet session.

Of major interest to members of the A.F.A. chapter was the banquet session, at which Maj. E. M. Culligan, Selective Service System, Washington, D. C., discussed "This Manpower Problem," and its probable effect on industry in general. A second speaker, Jas. S. Duncan, Massey-Harris Co., Ltd., Toronto, Canada, presented an interesting talk dealing with the subject, "After Victory, What?" Speakers at other sessions during the day discussed federal and state tax problems, social security legislation, and other important questions.

## Core Blowing Subject for Cincinnati Group

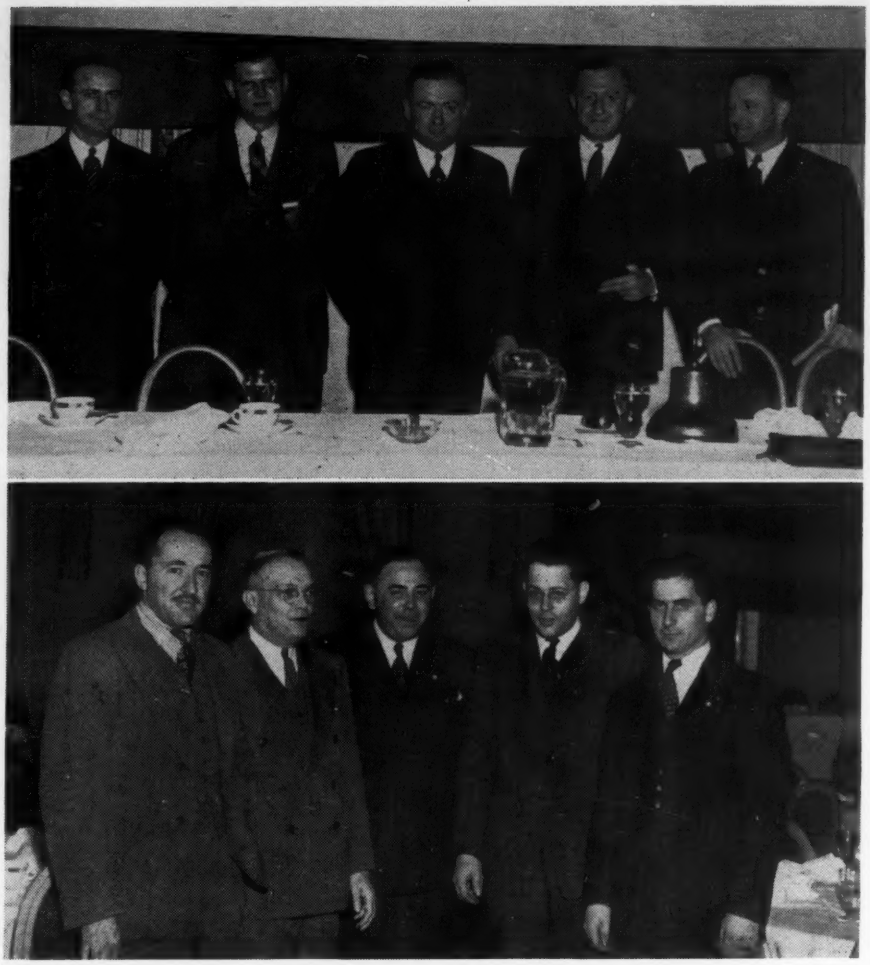
By Henry M. Wood,* Cincinnati, Ohio

M. J. GREGORY, Caterpillar Tractor Co., Peoria, Ill., and a National director of A.F.A., was the main guest speaker at the regular monthly meeting of the Cincinnati Chapter, held October 12 at the Cincinnati Club. Approximately 140 members and guests attended to hear Mr. Gregory, factory manager of his firm's foundry division, and Zigmond Madacey, core room superintendent for Caterpillar.

Mr. Gregory's talk dealt with general present-day conditions in the foundry, presenting many helpful ideas, supplemented with slides, regarding apprentices, upgrading and training of workers, and substitutions of alloys and scrap in cupola charges. Mr. Madacey discussed "Core Blowing for Job Castings," illustrating his talk with slides and exhibits of core boxes and cores. Spirited discussion followed both talks.

Chapter Chairman Frank E. Hutchinson, Reliance Foundry Co., presided at the meeting, at which several committee reports were presented, by Charley R. Hilb, H. Kramer & Co., on membership; Ed H. King, Hill & Griffith Co., on the program, and Stan T. Olinger, Cincinnati Gas & Electric Co., on the War Problems Committee. Herman K. Ewig, Cincinnati Milling Machine Co., presented the two speakers of the evening.

*W. W. Sly Mfg. Co., and Secretary, Cincinnati Chapter of A.F.A.



*(Photos courtesy John Bing, A. P. Green Fire Brick Co.)*

Discussion leaders (top) of the round-table sessions at the October 16 meeting of the Wisconsin chapter of A.F.A. Left to Right—Fred W. Hintze, Illinois Clay Products Co., Chicago, who spoke on Gray Iron; C. A. Sanders, American Colloid Co., the Malleable group; W. E. Simmons and Carl Gallouer, of W.P.B., on scrap salvage; Chapter President Geo. K. Dreher, Ampco Metal, Inc., Milwaukee. Bottom—A few of the members attending the meeting.

## New War Problems Committee for NEO

By Edwin Bremer,† Cleveland, Ohio

YET another A.F.A. chapter was added to the long list of those who now have appointed special War Problems Committees, with establishment of such a new group by the Northeastern Ohio Chapter. Announcement of the new committee was made November 12 at the organization's regular monthly meeting, at the Cleveland Club. F. G. Steinebach, *The Foundry*, Cleveland, is Chairman of the committee, full personnel of which is shown on page 33 of this issue.

Prior to the evening meeting, chapter members visited the Case School of Applied Science in Cleveland for a student-conducted tour of the foundry department and laboratories operated in connection with engineering education work. After the dinner the meeting was held at the Cleveland Club, with Chapter President J. H. Tressler, Hickman-Williams & Co., Cleveland, presiding. Members of the faculty of the Case School were guests for the evening, and included Dr. Wm. E. Wickenden, president of the School; Professors Vose, Donaldson, Prutton, Wierton, and Carson, and Instructors Hudec and Smith.

†*The Foundry*, and Chairman, Publicity Committee, Northeastern Ohio Chapter.

*(Photos Courtesy Sterling Farmer, Sand Products Corp.)*
**Recording in picture the October 8 meeting of the Northeastern Ohio Chapter, at Cleveland. Top—Chapter Chairman Jack Tressler, Hickman-Williams & Co., Cleveland, addressing the group. In the bottom picture, officers and directors of the chapter plan for the future. Seated around the table (left to right), C. E. Westover, Executive Vice-President of A.F.A., Chicago; Chapter Chairman Tressler; J. M. Lathrop, THE FOUNDRY, Cleveland, Chapter Secretary.**

R. E. Kennedy, National Secretary of A.F.A., Chicago, spoke briefly on functions of the newly appointed War Problems Committee and the work of the Association's Cupola Research Project. Ray Ride, director of athletics at Case School, presented the coffee talk.

Principal guest speaker was Dr. Wickenden, an authority on engineering education, who spoke on "Engineering Training and the Foundry Industry." He said that normal engineering training is designed mainly to give a student a sound understanding of the underlying basic principles and to develop him as a thinker and worker. One way to bring about closer cooperation between industry and the college, he stated, is for industry to provide research problems using college facilities.

## Dietert Speaks to Central Indiana Men

By R. A. Thompson,* Indianapolis, Ind.

GUEST speaker at the regular technical meeting of the Central Indiana Chapter, held November 2 at the Washington Hotel, Indianapolis, was Harry W. Dietert, Harry W. Dietert Co., Detroit, on the subject of "The Behavior of Sand and Cores in the Mold at Pouring Temperatures." Chapter Chairman B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, presided, with E. W. Smith, E. W. Smith Co., acting as Technical Chairman.

Mr. Dietert's subject, of great interest to the 125 members and guests who attended, was illustrated with excellent movies.

*Electric Steel Castings Co., and Secretary of Central Indiana Chapter.

## Synthetic Sand in War Work Is Subject for Metropolitan

By K. A. DeLonge,† New York

A THOROUGH discussion of the use of synthetic sand in a modern war production plant was presented at the November 2 meeting of the Metropolitan Chapter, held at Essex House, Newark, N. J., by W. F. Rose, chief of sand laboratories, Wright Aeronautical Corp., before 70 members and guests. The speaker was introduced by W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J., serving as Technical Chairman.

Mr. Rose detailed the properties of the synthetic sand used by his company, and discussed the sand in terms of brittleness in green condition, moisture content required and adaptability to reclamation. On the latter point he stated that Wright has found reclamation profitable through conserving sand, binder and inhibitor. Two important questions to consider when installing reclamation equipment were given as (1) how good a reclamation job is desired, and (2) at what rate sand is to be reclaimed.

The speaker offered recommendations for the type of sand adaptable to small electric furnace steel foundries as well as for general iron and steel requirements. He emphasized the importance of sand testing, and recommended that the moisture content of every batch of sand be checked, stating that this practice has resulted in definite reduction of scrap castings. He also described results in reclaiming core sands through calcina-

†International Nickel Co., and Secretary, Metropolitan Chapter.

*(Photos courtesy G. L. White, Westman Publications, Ltd.)*
**When the Ontario chapter held its annual picnic August 22 at Waterdown, Ontario, the outing had an appropriate atmosphere of the military, mainly because of a unique rifle marksmanship contest. The event was held at Barnesdale, the estate of Rolph Barnes, Wm. R. Barnes Co., Ltd., and drew a large attendance.**

tion, and gave estimated costs for the process.

## Sand Problems for Western New York

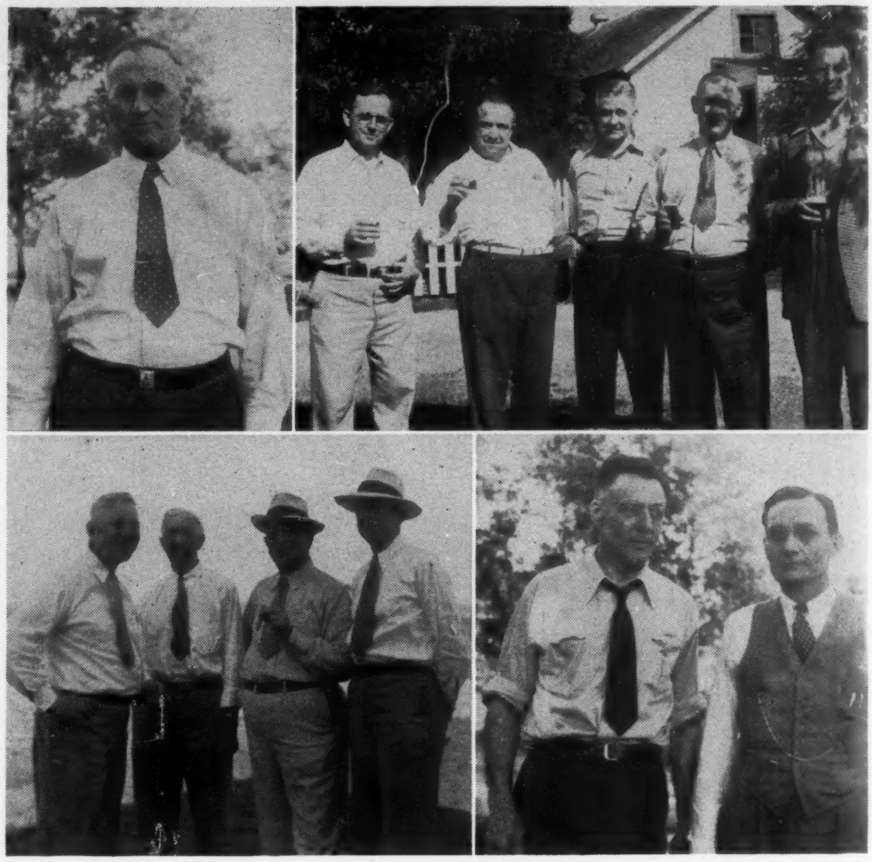
By J. R. Wark,* Buffalo, N. Y.

WELL over 110 members and guests of the Western New York Chapter of A.F.A. evidenced their enthusiasm in problems relating to foundry sand at the regular monthly meeting held November 6 at the Hotel Touraine, Buffalo. Chairman R. T. Rycroft, Jewell Alloy & Malleable Co., Inc., Buffalo, presided at the session, introducing the guest speaker and presiding at the Directors' meeting that followed the evening's main event.

H. W. Dietert, Harry W. Dietert Co., Detroit, was the guest speaker, with a most interesting talk on the "Behavior of Molding Sand and Cores at Elevated Temperatures." With the use of moving pictures Mr. Dietert clearly showed the action that takes place in the mold between sand and cores. He also illustrated breakdown and offered data on controlling hot strength through additions of iron oxides. A discussion period followed his talk.

Chairman Rycroft announced a new series of meetings to be held locally in connection with WPB, with every technical society to be represented to handle war problems. The death of John Gaffney, one of the real old time foundrymen in the chapter area, also was announced.

*Queen City Sand & Supply Co., and Secretary, Western New York Chapter.



*(Photos courtesy J. R. Wark, Queen City Sand & Supply Co.)*

Foundrymen give evidence of thoroughly enjoying themselves at the Western New York chapter's annual picnic. Top Row (left to right)—W. D. Hunsicker, Worthington Pump & Machinery Corp., Buffalo, (right, left to right)—E. R. Jones, Lumen Bearing Co., Buffalo; M. W. Pohlman, Pohlman Foundry Co., Inc., Buffalo; A. J. Heipel; Chapter Vice-Chairman F. E. Bates and W. D. Hunsicker, Worthington Pump & Machinery Corp.; John Wark, chapter Secretary-Treasurer. Bottom Row (left, left to right)—J. J. McCallum, McCallum Hatch Bronze Co., Inc., Buffalo; M. Fisher; Milton Finley; F. T. McQuillin, Standard Buffalo Foundry, Inc., Buffalo, (right, left to right)—J. J. Mayer, Lumen Bearing Co.; Robert K. Glass, Republic Steel Corp., Buffalo.

## X-Ray Is Western Michigan's Subject

By K. C. McCready,† Sparta, Mich.

CHAPTER Chairman C. J. Lonnee, Muskegon Piston Ring Co., Sparta, presided at the regular monthly meeting of the Western Michigan Chapter, held November 2, with 59 members and guests present. Program Chairman Don F. Seyferth, West Michigan Steel Foundry Co., Muskegon, announced program committees for the year and introduced the guest speaker, Stanley Davis, manager of X-ray, Campbell Wyant & Cannon Foundry Co., Muskegon.

Mr. Davis spoke on the subject of "Radiography with a Million Volt X-Ray Machine," covering the early field of X-raying castings as well as modern developments. He presented details of the construction and operation of the million volt machine and offered a number of X-ray films covering inspection of gears, shells, crank shafts, blocks and tank treads, explaining each film as to type of defect found, plane of field necessary to reveal types of defects, etc. Mr. Davis gave full technical data on filters, exposures and development of film, his paper being followed by general discussion of the X-ray technique for foundry work.

†Muskegon Piston Ring Co., and Secretary, Western Michigan Chapter.

## Core Blowing Topic for Quad City Group

By J. Morgan Johnson,** Moline, Ill.

DRAWN by the main subject of "Core Blowing," 95 members and guests of the Quad City Chapter attended the regular monthly meeting held October 19 at the Fort Armstrong Hotel, Rock Island, Ill. Alex D. Matheson, French & Hecht, Inc., Davenport, Iowa, presided as Chapter Chairman and introduced the principal speaker, Zigmund Madacey, Caterpillar Tractor Co., Peoria, Ill.

Mr. Madacey illustrated his talk with numerous examples of where core blowing could be applied. He emphasized particularly the importance of sand control, sand drying facilities, co-operation of various departments, and skill of operators in preparing mixes and

**Tri-City Manufacturers Association, and Secretary-Treasurer of the Quad City Chapter.

operating core blowing machines. Problems of the core room were presented to the speaker by a number of members in the discussion period that followed.

### September Meeting

First meeting of the new 1942-43 season was held by the Quad City Chapter on September 21 at the Hotel Blackhawk, Davenport, Iowa, with 66 attending. Vice-Chairman W. E. Jones, Ordnance Steel Foundry Co., Bettendorf, Iowa, presided, and announced appointments to the new War Problems Committee, Cupola Research Committee, and Membership Committee.

Guest speaker was Norman J. Dunbeck, Eastern Clay Products Co., Eifort, Ohio, who presented valuable information on "How to Select a Bond Clay." He described various types of clays and their applications in the foundry and discussed the particular characteristics of the various clay deposits known to exist in this country.

## Illinois-Wisconsin Hears Two Speakers

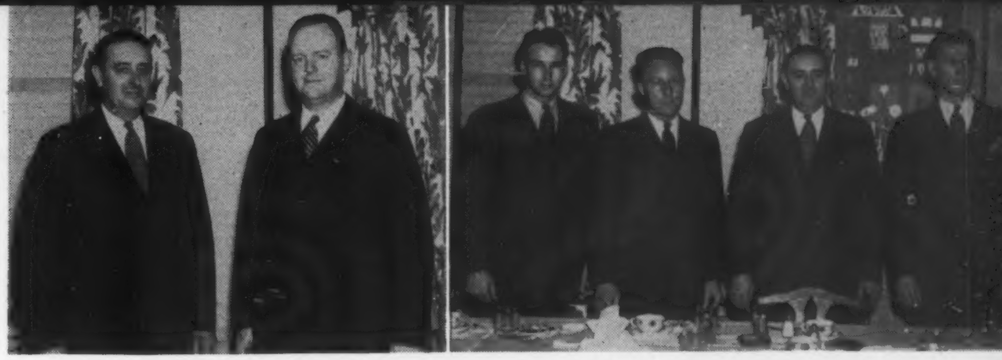
By J. H. McIntyre,* Beloit, Wis.

WITH 65 members and guests present, the Northern Illinois-Southern Wisconsin Chapter convened at the Hotel Hilton, Beloit, Wis., for their regular monthly meeting, October 13. Chapter Chairman Max J. Reuteler, Fairbanks Morse & Co., Beloit, presided and introduced the two speakers of the evening.

National A.F.A. President D. P. Forbes, Gunite Foundries Corp., Rockford, explained the Association's important Cupola Research Project, asking that all pledges of support to the work be sent in to national headquarters before the close of 1942. He pointed out that cupola is perhaps the one most important factor in all gray iron production, and stated the cupola research project should do much to improve cupola operation.

John Lee, Liberty Insurance Co., described the ever-increasing importance of accident prevention and declared that carelessness is literally a "Seventh Column" against our war effort. He quoted many statistics on what needless accidents are doing to America's war production effort and urged that greater attention be devoted to safety and safe practice education.

*Fairbanks Morse & Co., and Technical Secretary of the Northern Illinois-Southern Wisconsin A.F.A. Chapter.



(Photos courtesy John Bing, A. P. Green Fire Brick Co.)
Chapter officers and guest speaker pose for their pictures at the October 13 meeting of the Northern Illinois-Southern Wisconsin A.F.A. chapter at Beloit, Wis. Left to Right—Chapter Chairman Max J. Reuteler, Fairbanks Morse & Co., Beloit; National A.F.A. President Duncan P. Forbes, Gunite Foundries Corp., Rockford, Ill., guest speaker of the evening; R. W. Mattison, Mattison Machine Works, Rockford, Chapter Secretary-Treasurer; Roy D. Baysinger, Geo. D. Roper Corp., Rockford, Chapter Vice-Chairman; Chairman Max Reuteler; Technical Secretary J. H. McIntyre, Fairbanks Morse & Co., Beloit.

## Twin City Discussion on Cupola Operation

By O. W. Potter,† Minneapolis, Minn.

MEETING at the Midway Club, St. Paul, Minn., on November 16, 74 members and guests of the Twin City Chapter were treated to an interesting talk on "Cupola Operation" by B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, Ind., Chairman of the Central Indiana Chapter. His talk was illustrated with slides and black board, and a question period followed.

H. H. Blosjo, Minneapolis Electric Steel Castings Co., Minneapolis, presided in the absence of Chapter Chairman R. M. Aker. Secretary O. W. Potter introduced something new in the way of promoting acquaintanceship among the members, by announcing that fines would be levied on anyone sitting next to someone connected with the same company.

†University of Minnesota, and Secretary-Treasurer, Twin City chapter.

## Michiana Sets Up Own War Problems Group

By L. L. Andrus,** Mishawaka, Ind.

ALONG with other progressive A.F.A. Chapters, announcement was made at the October 16 meeting of the Michiana Chapter, held at Hotel Hoffman, South Bend, Ind., of formation of a new War Problems Committee, with R. E. Patterson, Elkhart Foundry & Machine Co., Elkhart, Ind., as Chairman. Members of this new group, organized to advise and assist foundrymen in the Michiana Chapter territory on problems pertaining to war efforts, will be found in the complete list of Chapter War Problems Committees on page 33 of this issue.

Chapter Chairman H. Klouman, Michiana Products Corp., Michigan City, presided at the meeting and appointed the following standing committee chairmen: Program, C. W. Petersen, Dodge Mfg. Corp., Mishawaka, Ind.; Membership, Jos Brajcki, Bendix Products Div., South Bend; Publicity, L. F. Tucker, City Pattern Works, South Bend; Entertainment, V. C. Bruce, Buckeye Products Co., Elkhart, Ind. Mr. Bruce was extended a vote of thanks from the chapter for his work as Chairman of the Entertainment Committee the past year.

Among the guests present was R. E. Kennedy, National Secretary of A.F.A., Chicago.

### November 4 Meeting

"Converting a Gray Iron Foundry to Steel" was the important subject presented to the Chapter at the November 4 regular meeting, held at Hotel La Salle, South Bend. M. J. Lefler, works manager, Western Foundry Co., Chicago, and the first president of the Michiana Chap-

**American Foundry Equipment Co., and Secretary-Treasurer, Michiana Chapter of A.F.A.

ter, was the guest speaker.

Mr. Lefler spoke of problems he encountered in making such a switch-over, including not only required changes and additions to existing patterns and equipment but also the problem of training men to handle an unfamiliar metal. Included in his talk were comments on the triplexing method of preparing steel, and use of converter.

## Southern California Declares "Problem Night" A Big Success

By E. M. Hagener,* Los Angeles, Calif.

MEMBERS of the Southern California Chapter gathered at the Elks Club, Los Angeles, on October 22, to try out a new type of program announced as "Problem Night," and found the experiment highly successful. Chapter President Earl Anderson, Enterprise Iron Works, Los Angeles, presided, and Program Chairman Walter F. Haggman, Foundry Specialties Co., Huntington Park, conducted the interesting session.

*General Metals Corp., and Secretary of the Southern California Chapter of A.F.A.

Prior to the meeting, questionnaires were sent to all members with a request to submit problems for discussion, and the interest of the meeting was shown by the type of questions submitted. Among them were the following:

"What is the best method to use in making non-ferrous bars for testing purposes?"

"Whose responsibility is it when a pattern is at fault and castings have to be scrapped?"

"What percentage of pig, steel and iron scrap should be used to obtain 40,000 tensile iron with 170 Brinnell?"

"What harmful effect will a silica brick have in the melting zone of a cupola?"

At the conclusion of the session, the members voted for a similar program in the near future.

More views from the annual outing of the Detroit Chapter. Top Row, Right—Chapter Secretary Art H. Allen, Penton Publishing Co., was on the job. Second Row, Right—Chapter Chairman Fred Melmoth. Third Row, Left—Vaughan Reid, City Pattern Works, and National A.F.A. director, always enjoys telling his stories; Right—Al Boegehold, General Motors Research Laboratories, and Vic Crosby, needed protection from the weather. Bottom Row, Right—Fred Melmoth, Chapter Chairman, joins the others at the outdoor refreshment fountain.

*(Photos courtesy F. A. Jensen, National Engineering Co.)*

## Melmoth Addresses Quad City Chapter

By H. L. Creps,† Moline, Ill.

A TOTAL of 135 turned out for the November 16 meeting of the Quad City Chapter of A.F.A., held at the LeClaire Hotel, Moline, Ill., members of the Tri-City Chapter of the American Society for Metals joining the foundrymen for the event. Chapter Chairman Alex D. Matheson, French & Hecht, Inc., Davenport, Iowa, presided.

Gordon T. William, Deere & Co., Moline, introduced the speaker of the evening responsible for the joint attendance, Fred A. Melmoth, Detroit Steel Casting Co., Detroit, and Chairman of the Detroit Chapter of A.F.A. Mr. Melmoth presented an important illustrated address on "Steel Castings," with his discussion confined to physical properties obtainable in spite of conservation of alloys. He outlined various types of heat treatment and drawing for cast steel to meet present specifications.

†Frank Foundries Corp., and Recording Secretary for the Quad City chapter.

## Birmingham Holds A Round Table Meeting

By H. B. McLaurine,** Birmingham, Ala.

BEGINNING a new season of meetings, the Birmingham District Chapter, American Foundrymen's Association, gathered at the Tutwiler Hotel, Birmingham, October 18. General subject up for discussion at this

**Reporter, Birmingham District Chapter of A.F.A.

meeting was "Raw Materials from the Procurement Angle."

C. P. Caldwell, Caldwell Foundry & Machine Co., Birmingham, handled discussion on steel foundry problems; Charles Wegelin, Dixie Bronze Co., Birmingham, on the non-ferrous foundry angle; and Warren Whitney, representing production foundries. Round-table discussion followed the more formal discussion period, and great interest was shown.

In addition, a Cupola Research Finance Committee was appointed, and a letter read by Chairman E. A. Thomas, Thomas Foundries, Inc., Birmingham, from National Secretary R. E. Kennedy, A.F.A. headquarters, Chicago, outlining the setup for continuing the Association membership of those in the armed services through suspension of dues for duration.

*(Photo courtesy S. M. Brah, Rustless Iron & Steel Corp.)*

Foremen of the Lynchburg Foundry & Machine Co., Lynchburg and Radford, Va., plants gathered at Roanoke, Va., recently for an important meeting on foreman training, a subject brought into sharp focus recently through the work of the Training Within Industry branch of the War Manpower Commission in conducting foreman training programs throughout the country.

## McElwee Stresses Economy and Precision Before Chesapeake

By Fred G. Bruggman,* Baltimore, Md.

THE regular monthly meeting of the Chesapeake Chapter of A.F.A. was held October 23 at the Engineers Club, Baltimore, with 65 members and guests attending and Chapter Chairman J. E. Crown, U. S. Naval Gun Factory, Washington, D. C., presiding. Speaker of the evening was R. G. McElwee, Vanadium Corp. of America, Detroit, whose topic, "Making Every Ounce Count," covered many points of interest to all foundrymen.

Mr. McElwee emphasized particularly the importance of economy as well as precision in obtaining uniform results in the final product. He pointed out that cast iron is not a single alloy but a series of alloys made up according to section thickness, sections varying from 1/4 inch to 8 inches definitely entailing a wide series of analyses. Charts were shown to illustrate the effect of late inoculations of alloys, such as chrome, and Mr. McElwee pointed out that there is a vast difference between a sound test bar and an ultimate sound casting.

An interesting feature of the evening was presented by J. H. Cochrane, Cochrane Brass Foundry, York, Pa., who displayed a red brass casting showing a gaseous condition. After explaining how the casting was made, the metal analyses and other details, he asked for a solution.

*Industrial Supply Corp., and Chapter Reporter for the Chesapeake Chapter.

Snapshots taken at the October 23 meeting of the Chesapeake Chapter. Top left—Technical Secretary Dave Tamor, American Chain & Cable Co., York, Pa., lines things up. Top right—R. G. McElwee, Vanadium Corp., of America, Detroit, guest speaker of the evening. Bottom — Examining a defective casting to see what caused the trouble.

*(Photos courtesy F. G. Bruggman, Industrial Supply Corp.)*

## Caterpillar Sponsors Sand Topics Meeting

FOUNDRYMEN of the Caterpillar Traction Co., Peoria, Ill., and from a number of nearby towns, gathered at the Caterpillar works September 19 to hear an interesting paper on "Sands," presented by Chas. Schureman, F. E. Schundler Co., Joliet, Ill. Some 400 attended the meeting, called specially by the Caterpillar firm, the group including visitors from Pekin, Galva and Canton, Ill., Attica, Ind., and other points.

Mr. Schureman's paper covered the use of sands in both ferrous and non-ferrous work, stressing particularly iron and steel operations. Following the presentation, many additional points were developed in a question period. The entire supervisory staff of the Caterpillar foundry attended, according to a report from M. J. Gregory, factory manager of the foundry division of the company, and a National director of A.F.A.

## Beg Your Pardon!

IN PRESENTING another group of new A.F.A. Chapter officers in the November issue of American Foundryman, the photograph of Roy A. Clark, Toledo Machine & Tool Div. of E. W. Bliss Co., Toledo, Ohio, and Vice-Chairman of the Toledo Chapter, was inadvertently ascribed as that of Ralph A. Clark, Lakey Foundry & Machine Co., Muskegon, Mich., and a Director of the Western Michigan Chapter. To both Messrs. Clark, apologies, and to Roy Clark of Toledo, his properly titled photograph is again reproduced in this issue on page 22.

## Book Review

*Plane Trigonometry Made Plain*, by Albert B. Carson, $5\frac{1}{2} \times 8\frac{1}{2}$, cloth cover, 398 pages, published by American Technical Society, Chicago, Ill. Price, $2.75.

This is a simplified text on the subject. The essentials of trigonometry are explained in greater detail than in most texts and an unusually large number of figures and illustrative examples are included. The latter section of the book contains tables of logarithms of numbers and natural trigonometric functions.

# Abstracts

**NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.**

**When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, New York.**

## Annealing

*(See Cast Iron.)*

## Blackheart Malleable

*(See Malleable Iron.)*

## Bronze

SULPHUR, ANTIMONY EFFECTS. *(See Non-Ferrous.)*

## Cast Iron

BRIQUETTES. *"Cupola Practice With Briquettes,"* W. A. Hambley and Kenneth Geist, *Iron Age*, vol. 150, No. 10, September 3, 1042, pp. 60-43. The use of briquettes is described for various base irons required by Allis-Chalmers Mfg. Co., West Allis, Wis. Inoculation technique, spout temperatures, and savings realized by briquetting borings and turnings are discussed. The use of baled silicon sheets as a source of low-carbon silicon is described. The percentages of briquettes used in cupola charges for soft iron, base iron, and high-test mixtures, are given. All materials charged are weighed with a fair degree of accuracy, and the melting loss is stated to be no more than for any other scrap. Oil on steel briquettes seems to have no effect on analysis. Scrap losses have not been increased by the use of briquettes, and a marked saving at present market prices has been revealed in the company's yearly melt.

CUPOLA OPERATION. *"Cupola Operation,"* W. O. McMahon, *Pig Iron Rough Notes*, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., No. 88, Spring 1942, pp. 31-35. The foundry, like every other war production industry, is losing many men into the armed services, to be replaced by younger men or men formerly in the industry. This article presents some fundamental points in cupola operation intended to help such men gain a better understanding of how iron is melted in the cupola. Cupola design factors, necessity of having proper tools handy, placing bottom doors and bottom sand, vent holes, and tap and slag holes, are discussed.

DESULPHURIZING. *"Desulphurizing at the Blast Furnace,"* G. S. Evans, *Iron Age*, vol. 149, No. 18, April 30, 1942, pp. 45-47. Methods of desulphurizing pig iron in the ladle and at the casting machine are described. Desulphurizing at blast furnaces not only offers means of increasing production of pig iron and steel at this time of emergency, but will prove profitable at many furnaces as it has at foundries, it is stated. It may be accomplished to the extent of 50 to 60 per cent of contained sulphur by any one of several practical systems. Desulphurizing reagents for commercial practice are, in order of activity, soda ash, soda ash caustic mixtures, and caustic soda. It is stated that by knowing the approximate sulphur content of the iron coming from the blast furnace, and varying the desulphurizing treatment accordingly, it is practical with iron of 0.09 per cent sulphur to reduce to 0.035 per cent by ladle treatment with soda ash. The most important factor in efficient desulphurizing, with the exception of the iron temperature, is rapid and intimate contact between the metal and soda slag. In view of the urgent need for steel to speed war production, this means of substantially increasing iron and steel production should not be overlooked.

HEAT TREATMENT. *"Normalizing and Annealing Gray Iron Castings,"* F. E. Fisher, *Pig Iron Rough Notes*, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., No. 89, Summer 1942, pp. 13-16. Many gray iron castings now used in the Army, Navy, Ordnance, Air Corps, Engineers, etc., carry a specification calling for a "stress-relief or annealing treatment." This article, avoiding technical phases of heat treatment, deals with normalizing and annealing as a means of aiding in the war effort. Normalizing or stress-relieving alloyed irons is accomplished as in plain irons, except that they are heated to higher temperatures. In most cases heating to 1505° F. is sufficient, but in higher alloyed irons it may be necessary to go as high as 1200° F. without causing carbide decomposition. Much of the normalizing of castings could be avoided if more attention were paid to design, casting cooling rate and analysis. The usual temperature for annealing plain irons ranges from 1450-1600° F., but the same results can be obtained by heating to a lower temperature and holding for a greater length of time. Annealing of alloyed irons is carried in much the same manner, except at higher temperatures, some alloyed irons requiring up to 1800° F. Alloy gray irons are less susceptible to damage during annealing.

SHEET SCRAP. *"Sheet Scrap in Cupola Charge," Metal Progress*, vol. 41, No. 1, January 1942, p. 75. Light steel sheet ranging to 30 gage can be used in the cupola charge for gray iron castings, preferably as a tightly compacted bundle. Many foundries are using such bales or bundles to good advantage in the cupola mix. Density and size of the bundles are important factors. Density can be controlled by the pressure used in the hydraulic presses forming the bundles, some foundries specifying a minimum density of 30 per cent. Smaller size bundles are required for cupola charges than for openhearth furnaces; when bundles are too large there is a tendency for hanging up in the cupola. While bundles of proper size and compression can be used in the cupola charge instead of other types of steel scrap, when steel scrap of any sort is used the composition must be figured and suitable additions made in order to secure the desired analysis in the metal. In these days of shortages of various materials, it is necessary to make many changes in the cupola raw materials, for a change in one portion of the charge usually means adjustment of the balance of the charge.

## Cupola Practice

*(See Cast Iron.)*

## Malleable Iron

APPLICATIONS. *"Malleable Irons—Possibilities for Application in the War Effort," Canadian Metals and Metallurgical Industries*, vol. 5, No. 8, August 1942, pp. 238-241. Report of Ore Dressing and Metallurgical Laboratories, Canadian Bureau of Mines, Ottawa, Investigation No. 1213. The usefulness of blackheart malleable cast iron and pearlitic malleable cast iron is considered as alternatives or substitutes for certain more critical materials. Manufacture, composition, physical properties, effect of temperature on properties, welding, and many industrial uses of blackheart malleable are given. Because of its good combination of strength, ductility and corrosion resistance, blackheart should be a satisfactory substitute for many applications, although it cannot be used where non-magnetic properties are required. General properties of pearlitic malleable cast irons are covered, as well as several trade name irons. Pearlitic malleable would seem to have a large potential field, due to wide variation of physical properties possible by heat treatment, either as a replacement for parts made from steel forgings or as a substitute in some applications for certain non-ferrous materials.

## Materials Handling

BRASS FOUNDRY. *"Brass Foundry Material Handling,"* J. M. Monroe, *Iron Age*, vol. 149, No. 16, April 16, 1942, p. 52. Use of a fork truck with a shovel and conveyor section attachment in a large brass foundry is described, also the rearrangement of a conveyor line permitting better materials handling methods at reduced costs. Flasks are placed on a roller conveyor that carries them onto special portable sections at the end of the conveyor line, each section containing eight molds. These sections are picked up by the fork truck and carried to the shakeout. A shovel attachment on the truck is used to scoop up sand spillage and dump it into storage bins or on piles, also to shovel up loose castings and place them in bins or boxes.

## Molding Practice

GREEN SAND. *"Green Sand Molds Dried by Infra-Red Lamps,"* L. M. Duryee, *The Foundry*, vol. 70, No. 4, April 1942, pp. 134, 218-220. An installation of infra-red lamps for drying green sand molds is described. Simple rigid frames were constructed of electric outlet boxes, ten frames of varying sizes being built to fit various

size flasks. A 2-inch distance between sand surface and lamps is ideal for fast drying. In seven months operation, navy specifications were successfully met, rejected castings eliminated, considerable labor saving made, and infra-red drying has proved the lowest in over-all drying cost of any method utilized at this plant. Maintenance cost is low, and much time is saved, skin drying to a depth of one inch penetration of dryness being accomplished in an hour. Handling of molds is reduced to a minimum and burling is eliminated.

## Non-Ferrous

BRONZE CASTINGS. *"Effects of Sulphur and Antimony on Steam or Valve Bronze Castings,"* A. J. Smith and J. W. Bolton, *A.S.T.M. Bulletin,* No. 116, May 1942, pp. 18-22. Loss of sources for certain high-quality, low-impurity virgin metals and diminishing sources of supply for higher purity scrap make it advisable to consider carefully the possible effect of increased "impurities." Paper deals with certain effects of sulphur and antimony on steam or valve bronze. The ingot specifications limit sulphur to 0.05% max., antimony to 0.20% max. Navy specifications prescribe manufacture from best grade virgin metals and approved scrap, thus implying that the limits of "impurities" should be quite low. Studies indicate that higher percentages of "impurities" may be permissible than are usual or permitted in today's practices, but also that there is an upper limit which should be prescribed to prevent marked diminution of properties at elevated temperatures. Room temperature and short-time elevated temperature tests at 550°F. suggest that 0.10% sulphur and 0.25% antimony may be permissible in the final cast alloy. At higher percentages, and especially when both of these impurities are above the maximum suggested, there is sufficient degradation to indicate that restrictions should be prescribed. The strength of the metal and its fluidity indicate that density troubles are not likely to occur.

PROPERTIES. *"Effect of Iron, Cobalt and Nickel in High-Purity Copper,"* J. S. Smart, Jr. and A. A. Smith, Jr., *The Metal Industry* (London), vol. 61, No. 13, Sept. 25, 1942, pp. 198-201. From paper presented before Amer. Inst. Mining and Metallurgical Engineers. Changes in conductivity and softening temperature derived from individual additions of the group VIII triad, iron, cobalt and nickel, to high-purity copper are described, as a part of the copper-research work of American Smelting & Refining Co. Methods of preparing and conducting tests are described. Conclusions are reached that (1) iron forms a limited series of solid solutions with oxygen-free copper and reduces its conductivity to marked degree; (2) nickel has comparatively small effect; (3) cobalt enters solid solution and is responsible for a sizeable decrease in conductivity; (4) nickel, cobalt and iron behave similarly with respect to softening temperature, but relative effect on resistivity increases in the direction of their displacement from copper in the periodic system by the whole number ratio 1:5:9.

## Normalizing

*(See Cast Iron.)*

## Radiography

*(See Testing.)*

## Sand Testing

*(See Testing.)*

## Scarp

SPARK TESTING. *(See Steel.)*

REDUCTION. *"Efficient Industrial Salvage—An Engineering Problem,"* Fred P. Peters, *Metals and Alloys,* vol. 16, No. 2, August 1942, pp. 249-252. Foreword to symposium on practical salvage and reclamation, held under auspices Amer. Soc. Mechanical Engineers, April 1942. Specific information and suggestions are given on how to conserve metals in design and production, how to reclaim worn and broken parts, how to keep scrap volume to a minimum, and how to operate so that whatever scrap is produced can ultimately be squeezed of its last drop of metal value. Efficient scrap reduction begins with the metallurgical design engineer and involves: (1) Specify materials with minimum tendency to produce scrap; (2) Select fabricating operations that involve little or no waste metal produced; (3) If possible, order parts in finished form, if their manufacture necessarily involves waste metal; (4) be sure that the maximum number of parts is produced from a given piece of metal with the minimum amount of scrap; (5) study possible design modifications that will permit the use of residual pieces, left after a regular stamping operation, in direct production; (6) specify general quality and precision no greater than is necessary for actual service requirements; (7) design to employ standard parts and tools wherever possible, thus avoiding grinding, machining or slitting to special sizes. Various shop reclamation methods are charted, showing typical applications, general useful information and their sources. Where a certain amount of scrap is unavoidable, essential suggestions are given for handling, sorting, segregating and converting.

STEEL ALLOY. *(See Steel.)*

## Steel

ACID FURNACE. *"Acid Steel Melting Practice,"* B. J. Aamodt, *The Foundry,* vol. 70, No. 4, April 1942, pp. 138-139, 212-214. Paper presented at October 1941 regional foundry conference, Purdue University, Lafayette, Ind. Main advantage in acid electric practice is cost . . . life of lining and roof; material, labor and power cost; higher tonnage output, higher viscosity slag, and metal fluidity. Various aspects of acid melting practice are dealt with in general, including pouring of test coupons and test bars, porosity testing, solubility, reactions and equilibrium, diffusion and flotation. Removal of hydrogen, nitrogen and carbon are discussed, as well as overcharging, the dead-melt and oxidation methods of melting, reduction of iron oxide, furnace and ladle additions, superheating. Items the melter usually is blamed for: Dirty steel, blow holes and porosity, hot tears, and low ductility. Some of these are the fault of other departments rather than the melter.

ALLOY SCRAP. *"Alloy Scrap in Steelmaking,"* C. H. Herty, Jr., *Metals and Alloys,* vol. 16, No. 2, August 1942, pp. 253-254. Part of a symposium on practical salvage and reclamation, held under auspices Amer. Soc. Mechanical Engineers, April 1942. Because of the tremendous importance of alloy steels to war production, maximum utilization of available alloys is absolutely necessary, a major item being proper recovery and utilization of all alloy steel scrap in all processes from ingot to finished products. Careful segregation means more opportunity for scrap to find its way into proper-analysis steels where it can be utilized to fullest possible extent. In some instances, die steels, high in nickel and chromium, and cutting tools, high in tungsten, have been found in ordinary scrap piles. Also, ferrous and non-ferrous scrap frequently is found in the same car. With proper pricing on segregated scrap, producers will find it patriotic and profitable to make certain that alloy scrap gets to the melting furnace where it can be of most good in the war effort.

ALLOY SCRAP. *"How to Identify Alloy Steel Scrap,"* L. P. Tarasov, *Iron Age,* vol. 149, No. 16, April 16, 1942, pp. 39-43. The present shortage of elements for alloy steel make highly desirable classification of steel scrap according to alloy content. Possibilities and limitations of spark testing as a means of identifying various types of steel scrap in consumers plants, as well as scrap dealers' yard, are discussed. Spark characteristics of steels containing carbon, chromium, nickel, manganese, molybdenum, vanadium and tungsten. Equipment required for spark testing is described, as well as spark identification and spark stream features. The proper way to segregate alloy steel scrap is to do so before its identity is lost, spark testing being useful here mainly as a check. Scrap of completely unknown antecedents can be classified only into a few major groups by spark testing, and here the method is valuable primarily with high alloy steels such as stainless.

CHEMICAL ANALYSIS. *"Standard Methods of Analysis—Accurate Procedures for Sulphur, Phosphorus aud Lead," Canadian Metals and Metallurgical Industries,* vol. 5, No. 7, July 1942, pp. 209-210. Standardized processes for determination of sulphur, phosphorus and lead, yielding comparable results when carried out by different chemists using the same samples of steel, are described as worked out by the Standard Methods of Analysis Sub-Committee of the Committee on Heterogeneity of Steel Ingots, of Iron and Steel Institute, England. Solutions and procedures are given for methods of determination of each constituent.

DESULPHURIZATION. *"Desulphurization in the Open-Hearth,"* Frank W. Scott and T. L. Joseph, *Iron and Steel* (London), vol. 15, No. 14, September 1942, pp. 447-499, 453. Results of a study on the effect of iron oxide on the desulphurizing power of calcium silicates at equilibrium. The effect of temperature on this equilibrium also is given. The effect of basicity is described, how iron retards the transfer of sulphur from metal to slag, temperature and distribution of sulphur, apparent equilibrium, rapid reaction, slag basicity ratio, and silicon changes.

HARDENABILITY. *"Hardenability of Steel,"* A. E. Focke, *Iron Age,* vol. 150, No. 9, August 27, 1942, pp. 43-51. The use of large alloy additions as a means of achieving deep hardening must be revised today, and greater attention given to controlling hardness depth by other means. Various tests for accomplishing this end are summarized, including the effect of variations in diameter and quenching media on critical hardness of steels.

PRODUCTION. *"Production of Uniform Steel for a Light Castings Foundry,"* C. H. Kain and L. W. Sanders, *Foundry Trade Journal,* vol. 67, No. 1353, July 23, 1942, pp. 281-286, 292. Paper presented at 39th annual conference Inst. of British Foundrymen, London. Description is given of routine employed to produce liquid steel at the periods when it is most required in a light castings foundry. Two processes are used, the basic electric and the Tropenas con-

verter. Stress is laid on standardized charging and working in the electric furnace, and a special technique employed in the cupola supplying iron for the converter. It is claimed that by employment of these methods, loss of production caused by the pouring floor waiting for the furnace, or vice versa, is eliminated. Appendices give details of the preparation of the linings, the properties of steels made, and a note on fluidity.

### Testing

RADIUM RADIOGRAPHY. *"High Sensitivity in Radium Radiography of Castings,"* L. W. Ball, *A.S.T.M. Bulletin*, No. 116, May 1942, pp. 29-32. Presented before June 1941 meeting of Amer. Soc. Testing Materials. Purpose of paper is to show that with suitable exploitation of the emulsion characteristics of Noscreen film, radium radiography provides a highly satisfactory method for examination of steel castings from 1/4 in. to 6 in. thick. Steel castings, like light alloy aircraft castings, should be segregated into three groups for radiographic procedures: "well-blocked" castings, "moderately blocked," and "badly blocked." Method of radiography investigation is described in detail. It is stated that the old conception that radium is a useful inspection tool only for great thickness of metal should be abandoned; that the combination of the stripping method described, high intensity, viewing, and a film that achieves the limiting emulsion contrast, provides an inspection method of great range and adequate sensitivity.

SAND. *"Recent Developments in Sand Testing,"* Wm. Y. Buchanan, *Foundry Trade Journal*, vol. 67, No. 1341, April 30, 1942, pp. 31-34; vol. 67, No. 1342, May 7, 1942, pp. 51-56. Comparative survey of British and American sand test investigations, read before Scottish Branch, Inst. of British Foundrymen. The work of the British Cast Iron Research Association and American Foundrymen's Association in the field of sand testing is reviewed comparatively, and differences between British and American methods reviewed as to cost of testing apparatus, clay determination, grain distribution, green deformation, ramming, test piece size. The May 1941 report of the A.F.A. Sand Research Committee by Dr. H. Ries is reviewed in detail, and discussion offered on data in sections by J. R. Young on comparison of test-piece sizes, by G. W. Ehrhart on the measurement of free expansion. Steel sand mixtures also are discussed in relation to testing procedures.

## December Chapter Meeting Schedule

**December 1**
**Michiana**
Hotel La Salle, South Bend, Ind.
C. F. CARSON
National Supply Co.

✦ ✦

**December 4**
**Chesapeake**
Engineers Club, Baltimore, Md.
H. W. DIETERT, Harry W. Dietert Co.
*"Sand Control in the Foundry"*

✦ ✦

**December 4**
**Western New York**
Hotel Touraine, Buffalo, N. Y.
WALTER CRAFTS, Union Carbide & Carbon Research Labs.
*"Deoxidizers for Cast Steel"*

✦ ✦

**December 7**
**Central Indiana**
Washington Hotel, Indianapolis, Ind.
M. J. GREGORY, Caterpillar Tractor Co.
*"The Selection of Molding Equipment"*

✦ ✦

**December 7**
**Chicago**
Chicago Bar Assn. Restaurant
A. R. BLACKBURN
Ohio Experiment Station
*"Chemistry of Refractories"*

✦ ✦

**December 7**
**Metropolitan**
Essex House, Newark, N. J.
SAM TOUR
Lucius Pitkin, Inc.
*"Substitutes for Critical Foundry Alloys"*

✦ ✦

**December 9**
**New England Foundrymen's Association**
Engineers Club, Boston

✦ ✦

**December 10**
**Northeastern Ohio**
Carter Hotel, Cleveland
*Annual Christmas Party*

**December 10**
**St. Louis District**
De Soto Hotel, St. Louis
*Annual Christmas Party*

✦ ✦

**December 11**
**Central New York**
Onondago Hotel, Syracuse
*Annual Christmas Party*

✦ ✦

**December 11**
**Philadelphia**
Engineers Club
E. J. BRADY, SR.
Alloy Rods Co.
*"Cooperation of the Engineer, Patternmaker and Foundryman"*

✦ ✦

**December 11**
**Quad City**
Blackhawk Hotel, Davenport, Iowa
*Annual Christmas Party*

✦ ✦

**December 11**
**Toledo**
Hillcrest Hotel
General Round Table Discussion

✦ ✦

**December 14**
**Western Michigan**
Ferry Hotel, Grand Haven, Mich.
*Annual Christmas Party*

✦ ✦

**December 17**
**Eastern Canada-Newfoundland**
Mount Royal Hotel, Montreal
R. J. KEELY
Ajax Metal Co.
*"The Use of Silicon Bronzes in the Conservation of Tin"*

✦ ✦

**December 17**
**Northern California**
*Old-Fashioned Christmas Party*

✦ ✦

**December 18**
**Wisconsin**
Hotel Schroeder, Milwaukee
*Annual Christmas Party*

**December 19**
**Cincinnati**
Netherland Plaza Hotel
*Annual Christmas Dinner Dance*

✦ ✦

**December 19**
**Northern Illinois-Southern Wisconsin**
Hotel Faust, Rockford, Ill.
*Annual Christmas Stag*

✦ ✦

**December 21**
**Philadelphia**
Engineers Club
*Annual Christmas Party*

✦ ✦

**January 4**
**Chicago**
Chicago Bar Assn. Restaurant
ROUND TABLE MEETINGS
Steel—*Heat Treating*
Gray Iron—*Material Substitutions*
Malleable—*Inspection Problems in Meeting Govt. Specifications*
Non-Ferrous—*Specifications and Inspection*
Patterns—*Maintenance Problems*

✦ ✦

**January 4**
**Metropolitan**
Essex House, Newark, N. J.
*"Better Quality in Castings Starts in the Foundry"*

✦ ✦

**January 8**
**Philadelphia**
Engineers Club
*"Non-Ferrous Strategic Alloys and Substitutes"*

✦ ✦

**January 8**
**Toledo**
Hillcrest Hotel
*"Cast Steel Problems"*

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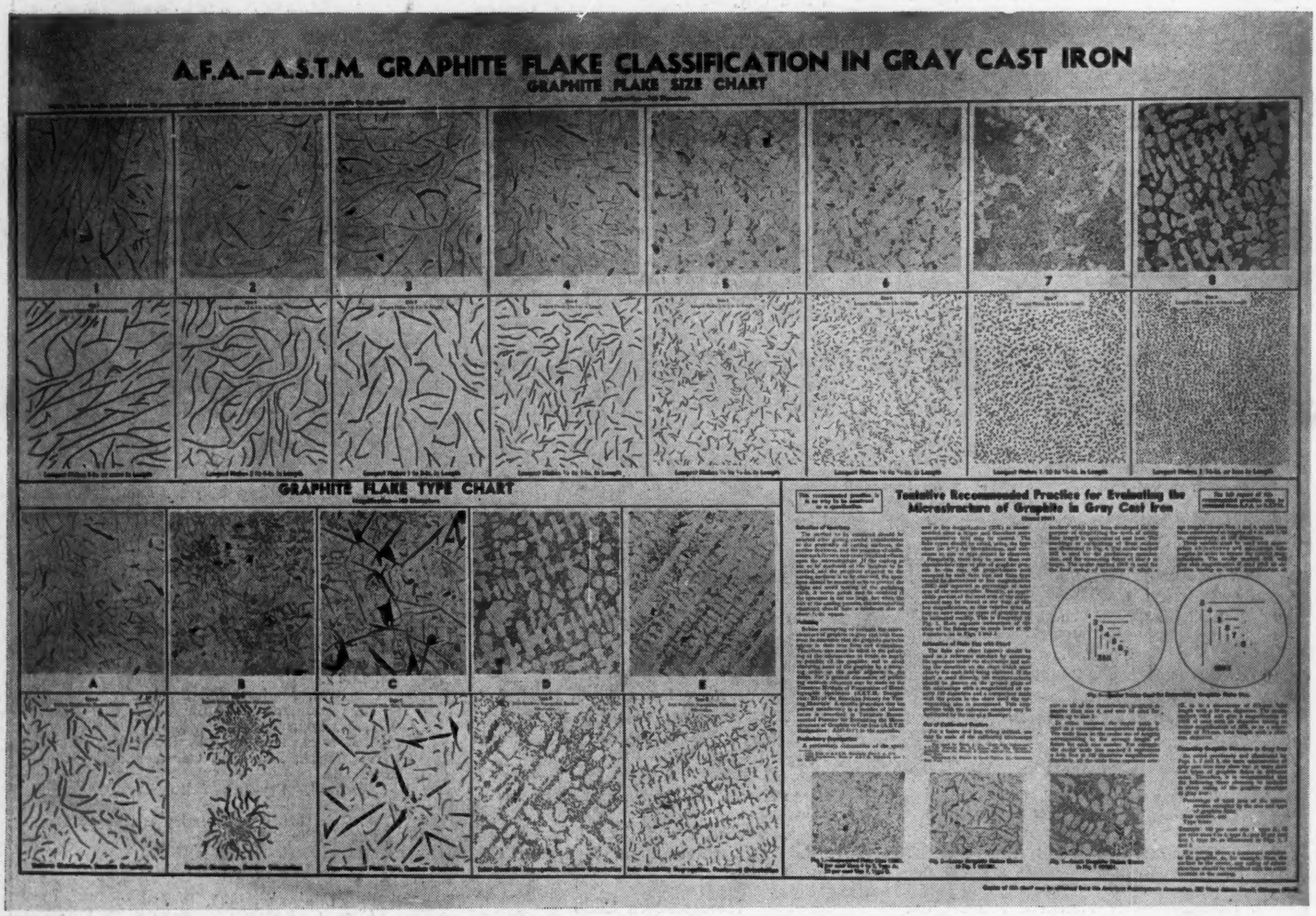


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